part number 104625

Datatest 2 Plus

Operator's Manual

Navtel

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Table of Contents

SECTION 1 **Introduction-How to use this manual** 4

SECTION 2 **General Description** 5
Option Information 6

SECTION 3 **Controls and Indicators** 7
Breakout box pins 7
LED indicators 7
DCE connector 7
± V source pins 7
Event pins 7
Tristate monitor 7
ON/OFF key 7
DTE connector 7
Sync indicator 8
Sync loss indicator 8
Trap indicator 8
Insert error indicator 8
LCD display 8
MON key 8
BERT key 9
ECHO key 9
POLL key 9
XMIT key 9
LINE key 9
LEVEL key 9
PROTO key 9
CLOCK key 10
SPEED key 10
DTE/DCE key 10
PARITY key 12
SYN key 12
CODE key 12
RTS/CTS key 12
TRAP key 12
ALARM key 12
TIMER key 12
TEST key 12
USER key 12
HOLD key 13
CLEAR key 13

INSERT ERROR key 13
ENTER key 13
HALT/RESULT key 13
RUN key 13
CURSOR keys 13

SECTION 4 Operation

Front panel layout 14
Self test 14
Simplified RUN procedure 14
Asynchronous character format 14
Data Codes 16
Sync characters 16
General Operation 16

Monitor Mode 20
Bert Mode 22
Echo Mode 24
Poll Mode 26
Xmit Mode 29
Interactive XMIT mode 31
Secondary Key Functions 32
Data trap 32
Alarm 34
Timer 35
Internal diagnostics (Test) 36
User messages 36

User defined data codes 39
Data rate accuracy 40
CRC-16, CRC-CCITT and LRC calculation 41
56 K bps testing 42
Warning display messages 43
Battery operation 43
Input/Output Mode 44
RAM Packs 45

SECTION 5 Applications

Modem testing Analog loopback 47
Digital loopback 48
Half duplex testing 49
RTS to CTS delay measurement 51

Synchronous clock slippage detection 52
Storing results of a test for later review 54
Transmission of only 1 block of data 54
CRT screen alignment test pattern generation 55
RS-232C cable testing 55
Dumb terminal simulation 56
Compatibility with uncommon character codes 57

Data monitoring and display 58
Data trap 59
Terminal testing 60
Printer testing 62
Time division multiplexer testing 63
Statistical multiplexer testing 64
Data edge transition detection 66
End to end system response time measurement 67
Fault isolation on active circuits - DTE or DCE 68
Remote transfer of setups 70
Remote transfer of results and setups 72
Permanent test setup storage 73
Retrieving setups from a database 76
Obtaining a printout of test results 77

SECTION 6 **Appendices**

Appendix 1: Datatest II Plus symbol table 78
Appendix 2: Code conversion charts 79
Appendix 3: User defined code translation tables 85
Appendix 4: Menu Table 90
Appendix 5: Glossary of Technical Terms 99
Appendix 6: Polling Worksheet 102

SECTION 1

Introduction

The Navtel Datatest II Plus is a microprocessor controlled data communications diagnostic test instrument. It provides a powerful selection of test functions and has been designed for maximum portability and ease of operation. All keys are functionally grouped by colour and every test and parameter has its own menu displayed in clear text.

The Datatest II Plus is a powerful extension of the standard Datatest II and provides additional capabilities outlined in section 2. It is intended for field service use and is equipped to thoroughly exercise full duplex, half duplex, and multidrop networks. It operates on asynchronous, synchronous, and bit oriented protocols, and has the ability to internally reconfigure itself as DTE, DCE, or data line monitor.

This technical manual has been designed to completely describe the use and operation of the Datatest II Plus. Any user unfamiliar with the test set should review this document in order to take full advantage of the capabilities of the device.

After the general description of section 2, section 3 explains the function of all controls and indicators. This section is intended as a guide to the purpose of the various parts of the test set. It does not describe its operation.

Section 4 explains the general operation of the test set, the self test, and how to set up menu parameters. Menus associated with special keys are reproduced along with the key sequences used to step through them. Graphical flowcharts illustrate how to use each function.

Section 5 lists various common applications for the device and provides step by step procedures for running each test.

Section 6 contains appendices consisting of tables and data conversion charts.

SECTION 2

General Description

The Datatest II Plus is a menu driven data communications diagnostic test set. It provides a wide variety of test functions, and is extremely easy to use. Powerful, yet compact and portable, it is ideally suited for field service applications.

The Datatest II Plus can transparently monitor a synchronous, asynchronous, SDLC, or HDLC line and display data traffic in HEX, BAUDOT, EBCD, ASCII, EBCDIC, or user definable codes. The unit also counts transmit and receive bytes, frames, parity errors, framing errors and BCC errors. The test set automatically stores the last set up for each test function every time is used. These combinations of parameters can be recalled weeks or months later, as the memory is backed up by protected batteries.

In the BERT mode, the Datatest II Plus counts bit errors, bits received, block errors, blocks received, error free seconds, errored seconds, framing errors, parity errors, BCC errors, sync losses, time outs, and performs BERT & BLERT calculations. As is true with all other modes, if an interface conductor is in the wrong state for the test to proceed or continue, the operator is warned with a display message.

The ECHO mode allows the user to store incoming data, and then retransmit that data when a programmable message delimiter is received. Or, alternatively, each incoming data character can be immediately retransmitted.

The POLL mode allows the Datatest II Plus to be programmed as a master or one of up to 32 slave stations. It permits a flexible multiple response polling structure suitable for a wide variety of applications. The master station automatically keeps track of the number of good responses, bad responses, unmatched responses, communication errors, and timeouts for each of the 32 stations.

The XMIT mode permits exhaustive testing of printers and other DTE's. As in all other modes, the tester may be internally configured as a DCE (with programmable RTS-CTS delay) as well as a DTE simply by pressing a key. No patching is required. The XMIT test sends the printable Baudot, EBCD, ASCII, or EBCDIC character sets, or any user defined test pattern up to 999 characters, with selectable form feed character, new line character, page length, and line length. The programmed pattern may be sent anywhere from 1 through 255 pages, or it may be set to repeat continually. Flow control in this mode is user definable over a character, line, or page boundary.

The device also incorporates an interactive mode, which permits the Datatest II Plus to simulate an on line terminal in order to act interactively with remote devices in real time.

The Datatest II Plus also incorporates several secondary test functions which can be run concurrently with any primary test function listed above. One example is the 4094 character TRAP function, which can store data before, on both sides of, or after an event. An event can be defined to be any character string on the transmit or receive data leads, any interface conductor changing state to mark or space, a sync loss, or an error.

The ALARM function, when enabled, will sound an alarm when one of several programmable events occurs. The TIMER function measures the time delay up to 1.67×10^7 milliseconds (approximately 4 hrs. 40 min) between any two interface conductors changing state, with 5 digit resolution. It will also note the order in which they changed state and in what direction. 16 user messages may be programmed which will never be lost unless cleared deliberately.

The device is powered by 6 rechargable ni-cad batteries. The batteries are protected by a special automatic shut off feature which prevents them from falling below a preset voltage threshold. Alternatively, the test set may be operated from the a.c. adapter supplied.

Option Information

A standard Datatest II Plus test set contains the input/output function and a trap door lid on the bottom of the unit. The trap door lid allows the user to easily and quickly install and remove optional application packs. The three application packs available are:

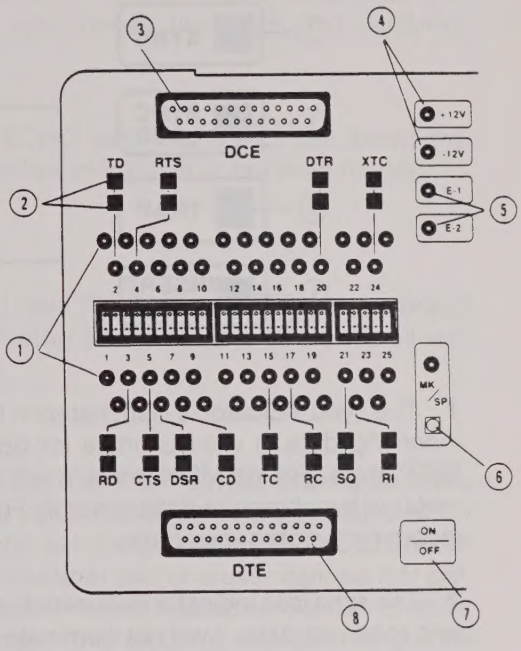
X.25
SNA/SDLC and
Distortion

All three application packs contain comprehensive monitor and diagnostic functions for thorough testing of those networks.

Any application packs purchased with the Datatest II Plus will be provided with their own documentation and are not described in this manual.

SECTION 3

Controls and Indicators



1 The **breakout box pins** are located on either side of the interface and allow any lead to be connected to any other lead, the tristate monitor, the ± V pins, or the event pins.

2 The **LED indicators** show the status of the key RS-232C interface leads. Each lead has 2 monitors. An illuminated red LED indicates an ON, or spacing signal. An illuminated green LED indicates an OFF, or marking signal. If neither LED is illuminated, the lead is between + 3 and – 3 volts (usually 0 volts).

3 The **DCE connector** is used to connect the Datatest II Plus to modems and other data communications equipment. Note that the connector can be internally configured as a DCE or DTE, depending upon the setting of DTE/DCE key.

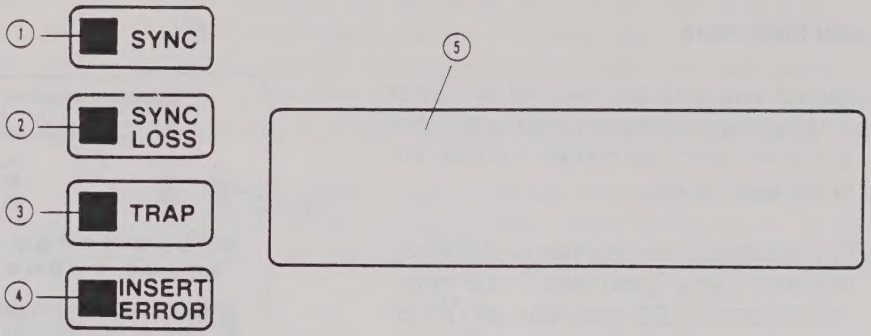
4 These 2 ± **V source pins** provide a source for steady signal space and steady signal mark. They are used in conjunction with the breakout pins to force signals off, or on, respectively. + Volts corresponds to a signal space, while - Volts corresponds to a signal mark.

5 The **event pins** are used with the trap, alarm, and timer tests as inputs from the breakout box pins. The conductors to be monitored for a change of state are connected to the event pins with the jumpers provided in the lid of the test set. The event pins are referred to as E1 and E2.

6 The **tristate monitor** allows connection to any breakout pin to determine the status of any interface conductor. Since the primary signals already have dedicated LED's, the tristate monitor is normally used to observe secondary signals.

7 The **ON/OFF key** is used to turn the Datatest II Plus on and off, although the device may shut itself off automatically if the batteries get too low. The unit will also shut off when it is not in the RUN mode and a key has not been pressed for 10 minutes.

8 The **DTE connector** is used to connect the Datatest II Plus to terminals and other data terminal equipment. Note that this connector may be internally configured as a DTE or DCE depending upon the setting of the DTE/DCE key.



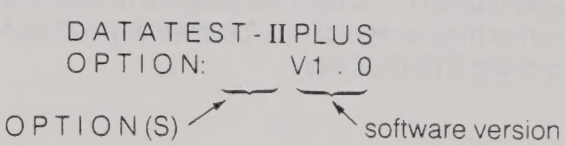
1 The **sync indicator** is illuminated in the BERT mode when the Datatest II Plus is in sync with incoming data. It will illuminate for both synchronous and asynchronous data while running BERT tests. For the MON mode, it will illuminate if the device is in sync with the selected channel(s) in synchronous data streams. For all other modes it will only illuminate when in sync with incoming synchronous data.

2 The **sync loss indicator** is illuminated in the BERT mode when the Datatest II Plus loses sync with received data. It will not illuminate unless the Datatest II Plus was originally in sync before the out of sync condition occurred.

3 The **trap indicator** will illuminate when the trap condition is met. It will turn off when RUN is pressed.

4 The **insert error indicator** is illuminated when the Datatest II Plus is in the insert error mode of operation. Errors may only be inserted in the BERT mode. To enter the insert error mode, press the INSERT ERROR key. This will cause one bit error per block to be transmitted until the INSERT ERROR key is pressed again to disable the insert error mode. Toggling the key allows more than 1 error per block.

5 The **LCD display** is used to present menu and parameter selections, test results, warning messages, and other information to the operator. The display format is 2 lines by 16 characters. When the ON/OFF key is initially pressed, the display gives a power on indication of the software version number and options (if any) installed (see illustration).



MON
M1

The **MON key** is pressed to select the monitor test. The monitor test allows the operator to transparently monitor the transmit side, the receive side, or both of an active network and display the data in hex, Baudot, EBCD, ASCII, EBCDIC, or a user definable code.

BERT
M2

The **BERT key** is pressed to select the BERT test. The BERT test counts bit errors, bits received, block errors, blocks received, error free seconds, errored seconds, framing errors, parity errors, BCC errors, sync losses, time outs, and performs BERT and BLER^{T} calculations.

ECHO
M3

The **ECHO key** is pressed to select the ECHO test. The ECHO test allows the operator to ECHO back incoming data in either immediate or buffered modes.

POLL
M4

The **POLL key** is pressed to select the POLL test. The POLL test allows the operator to set up the Datatest II Plus as either a master or one of up to 32 slaves, all with programmable addresses and messages.

XMIT
M5

The **XMIT** key is pressed to select the XMIT test. The XMIT test has been specifically designed for terminal and printer testing. It transmits the complete printable ASCII character set, the extended ASCII character set, the printable EBCDIC character set, the Baudot character set, the EBCD character set, or a user defined test pattern, with programmable new line characters, form feed character, number of pads, pad, character, line length, and page length. This mode is also used to put the Datatest II Plus into interactive operation, where it will simulate an on line terminal.

LINE
0

The **LINE key** is used to review or modify the line parameters. The possible choices are full duplex, half duplex, and multidrop. Full duplex refers to simultaneous 2 way data transmission. Half duplex refers to alternate 2 way transmission, with line switching dependant upon carrier detect changing state. Multidrop refers to alternate 2 way transmission where line switching occurs at the end of the received data pattern. In all DTE modes, carrier detect must be on to receive data if configured as a DTE.This key is also used to enter a '0' in the display, when programming a numeric value.

LEVEL
1

The **LEVEL key** is used to review or modify the data level. The level represents the number of **data bits** per character, and may be 5 (Baudot), 6 (EBCD), 7 (ASCII), or 8 (extended ASCII or EBCDIC). This key is also used to enter a '1' in the display, when programming a numeric value.

PROTO
2

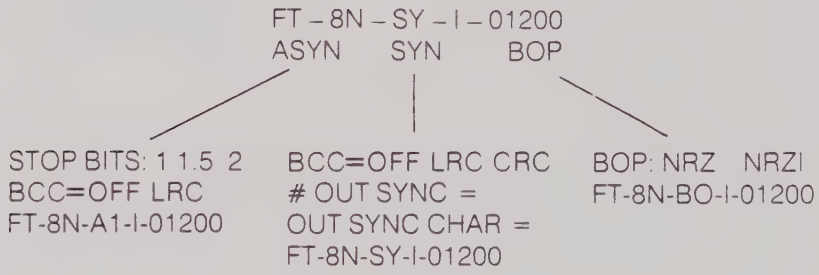
The **PROTO key** is used to review or modify the data protocol. The possible choices are asynchronous, synchronous, or BOP (bit oriented protocol). If asynchronous is selected, pressing the down cursor key allows the user to select 1, 1.5, or 2 stop bits per character, and determine block check to be off or LRC.

If synchronous is selected, pressing the down cursor key allows the user to decide block check (OFF, LRC or CRC); the number of outsync characters; and the definition of an outsync character.

If **BOP** is selected, the user then selects either NRZ or NRZI.

This key is also used to enter a '2' in the display, when programming a numeric value. The following figure illustrates the PROTO menu selections.

PROTO MENU



CLOCK 3

The **CLOCK key** is used to review or modify the clocking mode of the Datatest II Plus. Internal or external clock may be selected. Note that with external clock and asynchronous protocol, isochronous data can be generated. In DTE simulation, if external clock is selected with speed = 00000, XTC on pin 24 is disabled, and forced to the mark state. This key is also used to enter a '3' in the display, when programming a numeric value.

SPEED 4

The **SPEED key** is used to program the transmit and receive data rates of the Datatest II Plus. The operator may key in any rate from 30 bps to 56,000 bps, subject to an accuracy defined on page 25. Maximum fully functional data rate is 19.2 k bps. Half duplex communication is supported up to 56 Kbps in the MON and BERT modes. Please refer to **56 K bps testing** for more information. This key is also used to enter a '4' in the display, when programming a numeric value.

DTE/DCE 5

The **DTE/DCE key** is used to select either DTE or DCE simulation for both connectors. In either mode, the Datatest II Plus internally configures itself and no external patching is required. This key determines the receive side of the interface (DTE: pin 3, DCE: pin 2). This means that the setting of this key determines whether pin 2 or pin 3 data is trapped (DTE: trap on pin 3; DCE: trap on pin 2). The following 3 illustrations show the appropriate interface schematics:

PARITY 6

The **PARITY key** is used to modify the parity bit of the transmitted data. Odd, even, mark, space or none may be selected. Note that spacing and marking parity is not allowed in 8 level codes. This key is also used to enter a '6' in the display, when programming a numeric value.

SYN 7

The **SYN key** is used to select hex sync characters for synchronous communication. The setting of this key is not summarized on the lower display line in normal use. This key is also used to enter a '7' in the display, when programming a numeric value.

CODE 8

The **CODE key** is used to select the data code to be displayed and transmitted. Hex, Baudot, EBCD, ASCII, EBCDIC, or a user defined code may be selected. This selection is not summarized on the lower line of the display in normal use. This key is Note that the code will override the level selection. For example 5 level EBCDIC will be transmitted as 8 level EBCDIC.

RTS/CTS 9

The **RTS/CTS key** is used only when simulating a modem (DCE). This key allows the operator to program the RTS - CTS delay generated by the Datatest II Plus. The RTS/CTS key is also used to enter a '9' in the display, when programming a numeric value.

TRAP A

The **TRAP key** is used to select the trap function. This function will trap on a variety of programmable conditions and store 4094 characters of data. This secondary function can be run concurrently with any of the primary red key tasks. This key is also used to enter an 'A' in the display, when programming a hex value. For more information, see page 28.

ALARM B

The **ALARM key** is used to select the alarm function. The alarm will sound repeated beeps if a selected event occurs. This secondary function can be run concurrently with any of the primary red key tasks. This key is also used to enter a 'B' in the display, when programming a hex value. For more information, see page 30.

TIMER C

The **TIMER key** is used to select the timer function. The timer allows the operator to measure the delay between 2 interface conductors changing state. The maximum delay measurable is 1.67×10^7 milliseconds, approximately 4 hours and 40 minutes. A pulse of at least 1 millisecond duration is needed to activate the timer. This secondary function can be run concurrently with any primary red key task. This key is also used to enter a 'C' in the display, when programming a hex value. For more information, see page 31.

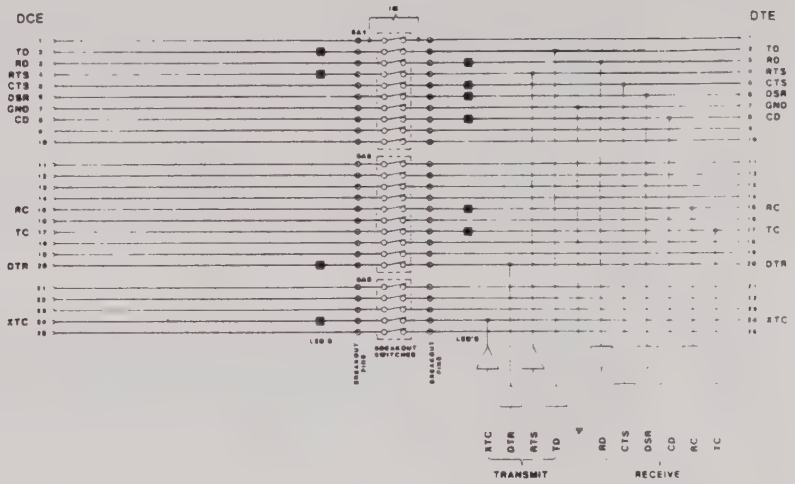
TEST D

The **TEST key** is used to select the test function. The test function provides a series of internal diagnostic self tests. This key is also used to enter a 'D' in the display, when programming a hex value. For more information, see page 32.

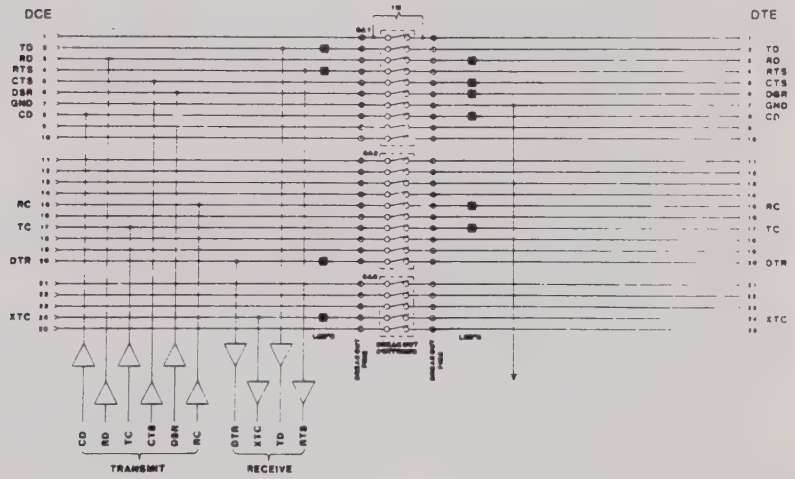
USER E

The **USER key** is used to select the user message function. This function allows the operator to enter up to 16 distinct user messages, which are permanently stored by the device unless deliberately cleared. The total length of all messages is 1023 characters, and any single message may not exceed 999 characters, although any message may be repeated up to 9 times, making the maximum message length 9990 characters. This key is also used to define the user programmable data code.

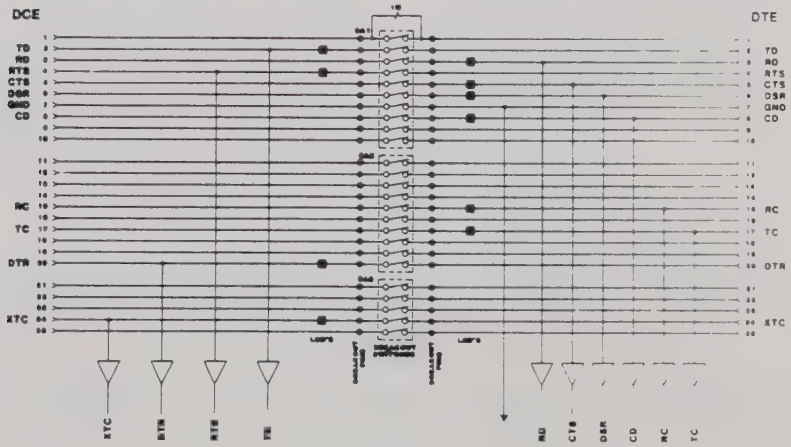
AS a DTE.



As a DCE:



As a monitor:



Note that in the DCE mode the RTS-CTS delay time can be programmed using the RTS/CTS key. The DTE/DCE key is also used to enter a '5' in the display, when programming a numeric value.

HOLD
F

The **HOLD key** is used to freeze the display data. The display is released by pressing HOLD again. **Note that the test is still in progress** and only the display is temporarily frozen. This key is also used to enter an 'F' in the display, when programming a hex value.

CLEAR

The **CLEAR key** is used to clear accumulated errors, user messages, data, and hex or numerical information from the display. It can also be used to reset a test mode to its default value by pressing a mode key, followed by the enter key, followed by CLEAR.

If the **CLEAR key** is pressed and held down for approximately 1 second, it will auto repeat at an increasing rate the longer it is pressed.

INSERT
ERROR

The **INSERT ERROR key** is pressed to insert errors into a transmitted data stream. Pressed once, and one bit error per block is inserted in the data. Pressed again, and the Datatest II Plus stops injecting errors. To insert an error in a user message requires a user message of at least 2 characters, not including sync characters.

ENTER

The **ENTER key** is used to enter hex or numerical information from the keyboard. It is also used to insert characters in user messages.

HALT
RESULT

The **HALT/RESULT key** is pressed to halt a test or measurement in progress, and show the results in the LCD display. This terminates the test. If data is displayed at this time, the operator may use the cursor keys to scroll through the previous 4094 characters of data which is automatically trapped when HALT/RESULT is pressed.

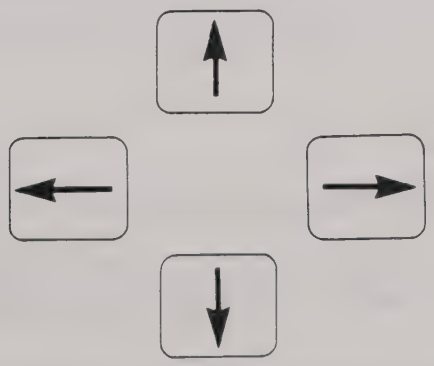
The Datatest II Plus will automatically store the results of the last test. When the **HALT/RESULT key** is pressed, the results of the **previously** run test will be displayed. This means that the test set may be turned off, and when turned back on again it will still have in memory the results of the previously run test, including the 4K buffer contents. It is important to note that it will always give the results for the previously run test, regardless of the present mode selected.

RUN

The **RUN key** is pressed to start any test.

The **CURSOR keys** are used to move the cursor around the display. The cursor is represented by the item in the display which is flashing. The cursor is also used when reviewing trapped data, or scrolling through test set ups or result menus.

The left and right cursor keys will auto repeat if pressed and held for approximately 1 second. The longer the key is held down, the faster the auto repeat function will operate.



SECTION 4 - Operation

Front panel layout

The front panel of the Datatest II Plus can be divided into 6 functional areas. The first section is the breakout box. This section contains the RS-232C connectors, breakout switches, pins, and LED's, as well as the ± V source pins and event pins.

The second section contains all display indicators. It includes the sync, sync loss, trap, and insert error LED indicators, as well as the LCD display. Aside from the breakout box LEDs, all test status messages, menu selections, and results will appear in this section.

All key sections are colour grouped by function. The third section contains all the red keys. A red key denotes a primary test function. In a standard Datatest II Plus these include power on/off, monitor, bert, echo, poll, and transmit. If options are installed menus M1 through M5 may also contain test functions.

The next section contains the light blue parameter set up keys. Each of these 10 keys allows the operator to either select from several choices, or program a hex or numerical value. For example, the LINE key allows the selection of full duplex, half duplex, or multidrop. Note that each key is also used to enter one of the numbers 0-9.

The fifth section contains all the dark blue keys. These keys are used to program secondary test functions, which may be run simultaneously with red key primary test functions. There is also a test key, which allows internal diagnostics, and a user key, for programming and modifying user messages. Note that each key is also used to enter one of the hex digits A-F.

The last section contains all the green keys. These keys are used to manipulate the menu, enter data, and control tests in progress.

For more information on any specific key, see section 3.

Self test

When the ON/OFF key is pressed, the device turns on and runs a brief internal self test. If there are no difficulties, at the end of the test "Self test passed" is written in the display, and the device automatically defaults to the monitor mode. If the self test encounters a problem area, one of the following messages will be written in the display: CPU RAM fault, Data RAM fault, EPROM fault, keyboard fault, or Battery low. For any of the first four conditions, turn the power off and back on again. If the problem persists, return the device to an authorized service center for repair with a description of the fault encountered. If Low battery is the indication, apply a.c. power. Be sure to recharge the batteries after use.

Simplified RUN procedure

The following steps summarize the operating procedure. More information on all steps is given in this section.

Step 1: Connect the Datatest II Plus to the device under test.

Step 2: Apply power to the Datatest II Plus.

Step 3: Select the red key test function to be performed.

Step 4: Press the down cursor key to program the test requirements.

Step 5: Use the light blue keys to match the operating parameters of the test to the network.

Step 6: Program the trap, alarm, timer, or user messages if desired.

Step 7: Press RUN.

Step 8: Use the down cursor key to cycle through the various counters to review test results.

Asynchronous character format

This section defines asynchronous character length and structure for all combinations of number of stop bits, data level, and parity. The results are summarized below, with the total number of bits per character in parenthesis.

Protocol

Level and Parity	Asynchronous 1	Asynchronous 2
5 level no parity	/1/d/d/d/d/d/1/ (7)	/1/d/d/d/d/d/1/1/ (8) also 1.5 stop: (7.5)
5 level with parity	/1/d/d/d/d/d/P/1/ (8)	/1/d/d/d/d/d/P/1/1/ (9) also 1.5 stop: (8.5)
6 level no parity	/1/d/d/d/d/d/d/1/ (8)	/1/d/d/d/d/d/d/1/1/ (9)
6 level with parity	/1/d/d/d/d/d/d/P/1/ (9)	/1/d/d/d/d/d/d/P/1/1/ (10)
7 level no parity	/1/d/d/d/d/d/d/d1/ (9)	/1/d/d/d/d/d/d/d/1/1/ (10)
7 level with parity	/1/d/d/d/d/d/d/d/P/1/ (10)	/1/d/d/d/d/d/d/d/P/1/1/ (11)
8 level no parity	/1/d/d/d/d/d/d/d/d/1/ (10)	/1/d/d/d/d/d/d/d/d/1/1/ (11)
8 level with parity	/1/d/d/d/d/d/d/d/d/P/1/ (11)	/1/d/d/d/d/d/d/d/d/P/1/1 (12)

8 level data with mark or space parity is not supported. 1.5 stop bits is displayed as A1 on the parameter summary. It is supported on all levels.

Sync characters

The SYN key is used to define characters used for synchronous transmission or reception of synchronous data. By leaving the second hex pair blank, and entering only the first, mono sync reception may be used. In addition, whenever a synchronous fox or user message is transmitted (with the exception of 8 level EBCDIC, see below), the device will automatically add the sync character(s) to the message. If more than 2 sync characters are desired, they must be added as part of the user message. When synchronous data is received, for analysis purposes the device strips off the sync characters and does not compare sync's in user messages. For example, with a poll message of

POLL SYN SYN POLL

the unit will transmit

SYN SYN POLL SYN SYN POLL

The receive compare message could be

POLL POLL

or POLL SYN SYN POLL

or SYN SYN POLL SYN SYN POLL

or a combination of the above. For the received data display, the leading sync characters will not be displayed. The others may or may not be suppressed depending upon the selection in the menu.

As mentioned above, the device will normally automatically add the sync characters to the start of a message. However, it is sometimes required to prefix the sync characters with a hex 55. This can be done using the code and level keys as shown below. Assume the message is POLL, and the sync characters are 32 32.

Code	Level	Transmitted message
ASCII	7 or 8	32 32 POLL
EBCDIC	7	32 32 POLL
EBCDIC	8	55 32 32 POLL

Hence, with EBCDIC code, the selection of 7 or 8 level acts as a gate to enable or disable the leading 55 hex pair.

General Operation

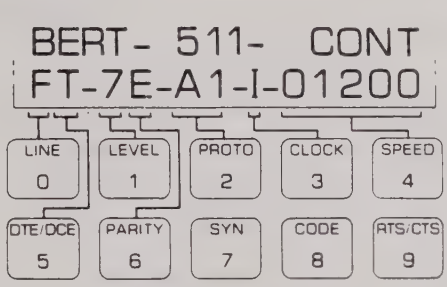
The Datatest II Plus is a menu driven test device. Parameter selection, mode set ups, and results are all displayed in this manner. Summaries of all menus are given in this section where appropriate and again in the appendices.

For each of the 5 test modes, the upper line of the display will indicate a summary of the test pa-

rameters, and the bottom line of the display will indicate a summary of the line parameters. Manipulation of the test parameters will be covered in detail for each test mode, along with a discussion of the appropriate result menus. The line parameters are used in a similar manner for all tests, although each test menu 'remembers' its own independent combination of parameters. For example, the BERT test could be set for full duplex, asynchronous 7 level even parity ASCII at 1200bps, while at the same time the POLL test is set for multidrop, synchronous 8 level no parity EBCDIC, at 9600 bps, and the XMIT test set for asynchronous 7 level odd parity ASCII at 300bps.

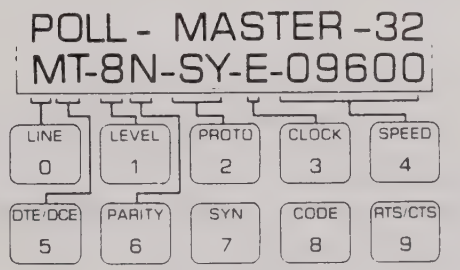
All line parameters may be programmed or reviewed using the light blue keys and green cursor keys. As mentioned above, each test mode has its own line parameter set up which is summarized on the lower line of the display. As an illustration, the sample BERT display shown below signifies:

Line:	Full
DTE/DCE:	DTE
Level:	7 level
Parity:	Even
Protocol:	Async
Clock:	Internal
Speed:	1200



As another example, a POLL test set up could be summarized in the following manner:

Line:	Multidrop
DTE/DCE:	DTE
Level:	8 level
Parity:	None
Protocol:	Sync
Clock:	External
Speed:	9600



Note that the settings of the SYN, CODE, and RTS/CTS keys are not shown in the parameter summary line. They may be reviewed by pressing the appropriate key. To change a parameter, press the desired light blue parameter key and the parameter selections for that key will be displayed. The selected choice will flash. Use the cursor left and cursor right keys to make the desired selection. Once the selection has been made, **press the down cursor key** to return to the normal parameter summary display. In the case of the SPEED, SYN, and RTS/CTS keys, the operator must select numerical (for the SPEED and RTS/CTS keys) or hex digits (for the SYN key) in order to program the parameter. These are entered using the light (0-9) and dark (A-F) blue keys. If an error is made, the operator can either overstrike using the green cursor keys, or clear the entry by pressing the CLEAR key. For example, assume in the monitor mode you wish to change the parity from even to none. This can be done in the following manner:

Action	Display
On/off key pressed:	MON-BOTH-SUP = FF FT-7E-A1-I-01200
Parity key pressed:	MON-BOTH-SUP = FF ODD EVEN MARK (EVEN flashing)
Press cursor right key:	MON-BOTH-SUP = FF EVEN MARK SPACE (MARK flashing)
Press cursor right key:	MON-BOTH-SUP = FF MARK SPACE NONE (SPACE flashing)
Press cursor right key:	MON-BOTH-SUP = FF MARK SPACE NONE (NONE flashing)
Press down cursor key:	MON-BOTH-SUP = FF FT-7N-A1-I-01200

The possible parameter selections are given below.

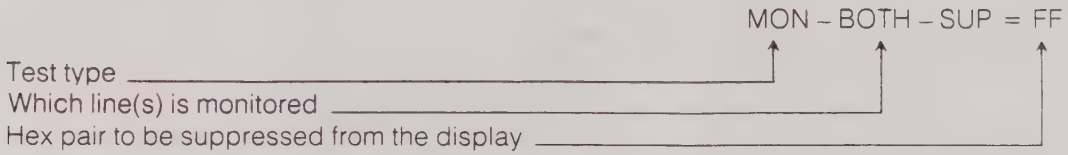
Line:	Full duplex, half duplex, multidrop
Level:	(number of data bits per character) 5 level, 6 level, 7 level, 8 level
Proto:	(protocol) Async , Sync, BOP (HDLC/SDLC)
Clock:	Internal, External
Speed:	30 bps to 56000 bps, restricted operation above 19200 bps (see **56 K bps testing**)
DTE/DCE:	DTE or DCE simulation
Parity:	Odd, even, mark, space, none
Syn:	sync character selection (2 hex pairs)
Code:	HEX, ASCII, EBCDIC, BAUDOT, EBCD, USR
RTS/CTS:	000 to 999 milliseconds (used for DCE simulation)

It is possible to copy the parameter set up of one mode to another mode. By pressing any red mode key, followed by the enter key, followed by any other red mode key, all the line parameters associated with the second mode key are simultaneously programmed into the first. For example the BERT parameters could be copied into the XMIT mode in the following manner:

Action	Display
Initial state	BERT-FOX-CONT FT-8N-SY-E-01200
Initial state	XMIT-L132-P060 HC-7E-A2-I-00300
Press XMIT:	XMIT-L132-P060 HC-7E-A2-I-00300
Press ENTER:	XMIT-L132-P060 HC-7E-A2-I-00300
Press BERT:	XMIT-L132-P060 FT-8N-SY-E-01200

MONITOR MODE
Monitoring data

The red MON key selects the monitor mode. In this mode, the Datatest II Plus will monitor and display transmit data, receive data, or both. Transmit data (data on pin 2 of the interface) is always presented on the upper display line, while receive data (data on pin 3 of the interface) is always presented on the lower line of the interface. Data may be viewed in hex, Baudot, EBCD, ASCII, EBCDIC, or a user defined code, using the CODE key. While in the RUN mode, the CODE key may be pressed to change the display from one code to the next. The upper display line in the monitor mode will appear in the following format:



By pressing the cursor down key, the operator may cycle through the menu status indicators and make the following selections:

FT-8N-SY-E-02400	
BOTH TD RD	monitor either transmit data, receive data, or both
SUPPRESS CHAR = XX	define a character to be suppressed from the display
SUPPRESS SYN?Y/N	select whether or not to display sync characters
FT-8N-SY-E-02400	return to normal display

The menu may be scrolled backwards at any time by using the up cursor key.

Operation

Step 1: Connect the Datatest II Plus in line between DTE and DCE.
Step 2: Use the green cursor keys to program the upper display menu.
Step 3: Use the light blue parameter set up keys to match the operating characteristics of the network. Ensure especially that the SYN, PARITY and CODE keys are set correctly .
Step 4: Program the trap, alarm, and/or timer if required.
Step 5: Press RUN.

At most data rates the size of the display would make it difficult to read if every character were displayed . Hence, the Datatest II Plus will sequentially display 'snapshots' of the data, at approximately 300 millisecond intervals. Note that this display method in no way affects the analysis of the data. Every character is examined and analysed, though of practical necessity some are not displayed.

While running the test, the operator may use the cursor key to scroll through the counters and review the timer, the number of transmit and receive bytes, frames, parity errors, framing errors, and CRC-CCITT or CRC-16 errors.

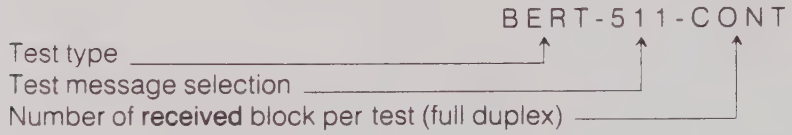
By pressing the HOLD key, the operator can freeze the display. Pressing the key again releases the display. The HALT key will cause the most recent 4094 characters to be stored in the display buffer. These characters can be observed by pressing either the cursor left key to move one character at a time, or the enter key, followed by either the cursor left key or the cursor right key to move 16 characters (for Baudot, EBCD, ASCII, EBCDIC, or usr) or 5 hex pairs (1 display width) at a time. By holding either the cursor right or cursor left keys down for 1 second, the key will be repeated at an increasing rate while the key is pressed. If the trap is activated, and the trap condition is satisfied, the test will stop. Note that trapped data may be transferred to be a user message as described under "User messages". Enter, up cursor will move to the beginning of the buffer, and ENTER, down cursor will move to the end of the buffer.

Consult section 5 for detailed applications examples illustrating the use of the monitor function.

BERT MODE
Bit error rate testing

Bit error rate testing is performed using the BERT mode. In this mode, the Datatest II Plus performs 17 tasks at the same time, in addition to any secondary tasks (trap, alarm, etc.) It simultaneously displays the data (only if fox or user), enables the timer, summarizes the selected line parameters, counts bits received, bit errors, block received, block errors, error free seconds, errored seconds, framing errors, parity errors, BCC errors, sync losses, time outs (for half duplex circuits), and performs BERT and BLERT calculations.

The upper display line in the BERT mode will appear in the following format:



By pressing the down cursor key, the operator may cycle through the menu status indicators and make the following selections:

63, 511, 2047, 4095, ALT, FOX, USER (0-F) — test message
Continuous, 10e(0-6) — # of blocks to be received (assuming full duplex)
TIMEOUT = X SEC — In half duplex or multidrop delay xsec before turnaound.
Simplex? N/Y

The first 4 messages are pseudo random patterns, and the ALT message is the alternate mark-space pattern. These messages have a defined block length of 1000 data bits (parity, start and stop bits are not included). For 7 level codes, a block will be 1001 bits. The block length for fox and user messages is defined as 1 message. Hence, a block of 511 is 1000 bits, while a block of fox is the number of data bits in the fox message. The FOX pattern may be transmitted in Baudot, EBCD, ASCII, extended ASCII, or EBCDIC. In the case where the code and level settings are inconsistent, the code setting will take priority. The following chart illustrates the possible combinations.

Fox message selection

Code	Level	Message transmitted	Block length
Hex	5	Baudot fox	315 data bits
Hex	6	EBCD fox	378 data bits
Hex	7	ASCII fox	434 data bits
Hex	8	EBCDIC fox	496 data bits
Baudot	5,6,7,8	Baudot fox	315 data bits
EBCD	5,6,7,8	EBCD fox	378 data bits
ASCII	5,6,7	ASCII fox	434 data bits
ASCII	8	Extended ASCII fox	496 data bits
EBCDIC	5,6,7,8	EBCDIC fox	496 data bits
usr	5,6,7,8	ILLEGAL COMBINATION:	ERROR MESSAGE

The block count gives the total number of **received** blocks before the test ends. Hence, with a loopback circuit, the test could be set to end after 10e3 blocks (=1,000,000 bits with 511) have been received. With half duplex, any finite block count will ensure the line turns around every time 1 block is transmitted or received. With a count of 10e3, 1000 blocks will be received before the test stops. If simplex is selected, the unit will receive until halted (if RUN is pressed once), or transmit until halted (if RUN is pressed twice). The parameters line (lower line of LCD) will blink if simplex is selected.

Flow control using the Datatest II Plus can be accomplished with either the BERT or the XMIT function. In this manner printers, terminals, and multiplexers may be tested. In the BERT function, flow control is always affected on a character boundary, and the control characters are XON (hex 11) and XOFF (hex 13). This means that within two characters of XOFF being received, the Datatest II Plus will stop transmitting, and restart transmission within one character time of XON being received. The following table summarizes when XON/XOFF control in the BERT mode is enabled.

Mode	protocol	line	message	level	XON/XOFF
BERT	async	full	fox or user	7 or 8	enabled
BERT	sync or BOP	half or multi	PRW or ALT	5 or 6	disabled

Operation

Step 1: Connect the Datatest II Plus to the device under test.
Step 2: Press the ON/OFF key.
Step 3: After the selftest, press the red BERT key.
Step 4: Use the green cursor keys to select the message and block count.
Step 5: Use the light blue parameter set up keys to match the operating characteristics of the network.
Step 6: Press RUN.

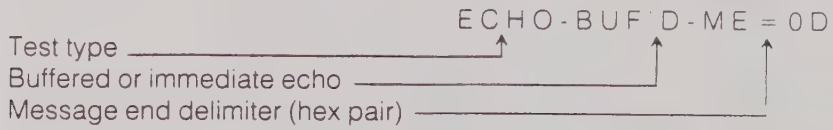
To insert one error per block, press the ERROR INSERT key. To stop inserting errors, press the key again. To review the test counters, press the down cursor key. The CLEAR key may be used to reset all counters to zero. **Note that data will only be displayed for the fox or user patterns.** To halt the test, press the HALT key.

Consult section 5 for detailed applications examples illustrating the use of the BERT function.

ECHO MODE
Echoing data

In the ECHO mode, the Datatest II Plus will echo incoming data back to the transmitting device. There are 2 types of echo, immediate and buffered. With immediate echo, every character received is automatically retransmitted. In buffered echo, the test set captures and stores incoming data until either a): the buffer is full (250 characters) b) async: a message end delimiter hex pair is received, at which time the test set retransmits the stored data, or c) in sync or BOP, at the end of a block. The BCC is re-generated in buffered echo.

The upper display line in the echo mode will appear in the following format:



By pressing the cursor down key, the operator may cycle through the menu status indicators and make the following selections:

cursor down:	Immediate, Buffered
cursor down:	Message end delimiter = (any hex pair, OD = ASCII carriage return)

Note that for immediate echo with synchronous data, the unit must be set for full duplex. Data will not be displayed in this mode.

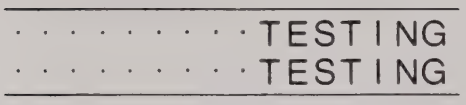
Operation

Step 1: Connect the Datatest II Plus to the device under test.
Step 2: Press the ON/OFF key.
Step 3: After the selftest, press the ECHO key.
Step 4: Use the cursor keys to select immediate or buffered echo. If buffered echo, select also the message end delimiter.
Step 5: Use the light blue parameter set up keys to match the operating characteristics of the network.
Step 6: Press RUN.

The display will indicate both the incoming receive data (lower display line) and also echoed transmit data (upper display line). This assumes DTE simulation, as the reverse would be true if DCE simulation were used. Note that as in all other modes, the timer is enabled, and may be reset by pressing the CLEAR key.

As an example, assume the Datatest II Plus were connected to an asynchronous, full duplex terminal and the letters "TESTING" were keyed in. The message end character is set for 47 hex (G). The Datatest II Plus display would appear as follows:

Immediate ECHO



Each character would appear on the terminal screen as it is keyed in.

Buffered ECHO

Nothing would be sent until the G key was pressed, and TESTING would then appear on the LED.

Consult section 5 for detailed applications examples illustrating the use of the ECHO function.

POLL MODE
Polling

The polling mode allows the Datatest II Plus to thoroughly exercise and troubleshoot multidrop facilities. The polling format may be configured in a flexible manner to suit a variety of networks and protocols.

In the polling mode, the unit may be set up as a master station or a slave station. If it is a master station, then it will control the communications between it and the slave station(s) keeping track of the performance for each station. As a slave station, it will respond properly when polled and keep track of the number of times it recognized that it was polled.

The master station polls in the following manner. First, it transmits a primary poll message, or general poll. When a response to the poll is received, the unit compares the response to a maximum of 7 different expected responses. If there is a match, it will then send out the appropriate new user message to the same slave, depending upon the response received. The master keeps track of the statistics for each slave. Specifically, the following conditions are counted for each slave station:

Good responses:	an exact match of the condition that will cause the poll message to be transmitted.
Bad responses:	the sum of the unmatched responses, communication errors, and timeouts
Unmatched responses:	a response received which does not match any of the preprogrammed valid responses
Communication errors:	Async: parity, start/stop bit error or LRC error Sync: CRC-16, LRC or parity error BOP: CRC-CCITT error
Timeouts:	no response at all to a poll within a preset time interval.

The Datatest II Plus incorporates an address substitution scheme for both ease of use and also conservation of memory space. This is made possible by the fact that the only thing which differs in the poll message from station to station is the individual station addresses. When entering the poll message, the user inserts a pair of special characters (8F hex) at the address position in the poll message. The individual station addresses are also entered. When the message is transmitted, the Datatest II Plus sequentially substitutes the proper station address pair at the (8F) position in the poll message. In this manner, the poll can be sent to 32 different stations using only one user message. For example, if the poll message was

32 32 37 FF FF 32 32 40 40 8F 8F 2D FF FF

and there were 5 stations with addresses C1 C1, C2 C2, C3 C3, C4 C4, and C5 C5, then the test set would cyclically substitute the various addresses for 8F 8F, so that the following 5 poll messages would be transmitted:

32 32 37 FF FF 32 32 40 40 C1 C1 2D FF FF
32 32 37 FF FF 32 32 40 40 C2 C2 2D FF FF
32 32 37 FF FF 32 32 40 40 C3 C3 2D FF FF
32 32 37 FF FF 32 32 40 40 C4 C4 2D FF FF
32 32 37 FF FF 32 32 40 40 C5 C5 2D FF FF

To set up a polling routine, you must first select the polling function by pressing the POLL key. As with all other modes, the down cursor key is used to enter the poll menu.

Note that a "don't care" character (hex 80) may be specified in an response message. For example, if the response message was 02 80 80 F1, then any response having 02 and F1 in the proper positions in the message would be considered a good response.

To select the various POLL parameters, the user steps through the menu using the down cursor. As the down cursor is pressed, the lower line of the display will take the following format:

Display	Comment
FT-8N-SY-E-04800	Summary of blue key line parameters
MASTER SLAVE	Selection of master or slave mode
POLL MSG = USERX	Selection of initial poll message
#OF CONDITIONS = ■	Number of possible responses to initial poll message (7 max)
1IF usrX_1 TX usr Y_1	If response X_1 is detected, transmit message Y_1 (Note: $X_1 \rightarrow X_7$ & $Y_1 \rightarrow Y_7$ are all selected from the user messages 0-F)
2IF usrX_2 TX usr Y_2	If response X_2 is detected, transmit message Y_2 (if # conditions > 1)
3IF usrX_3 TX usr Y_3	If response X_3 is detected, transmit message Y_3 (if # conditions > 2)
4IF usrX_4 TX usr Y_4	If response X_4 is detected, transmit message Y_4 (if # conditions > 3)
5IF usrX_5 TX usr Y_5	If response X_5 is detected, transmit message Y_5 (if # conditions > 4)
6IF usrX_6 TX usr Y_6	If response X_6 is detected, transmit message Y_6 (if # conditions > 5)
7IF usrX_7 TX usr X	If response X_7 is detected, transmit message X (if # conditions = 7)
***	Note: as shown in condition 7, there **must** be a closed loop back to the initial poll message. It can be in any or several condition statements. Use the ← and → keys to scroll from one condition to another.

NUMBER OF STN = ■■	Number of slave stations or terminals to be polled (max 32)
STN 01 ID = ■■-■■	Key in station #1's address (2 hex pairs)
STN 02 ID = ■■-■■	Key in station #2's address (2 hex pairs) (If # stations > 1)
STN 03 ID = ■■-■■	Key in station #3's address (2 hex pairs) (If # stations > 2)
. . .	. . .
. . .	. . .
. . .	. . .
STN 32 ID = ■■-■■	Key in station #32's address (2 hex pairs) (If # stations = 32). Use the ← and → keys to scroll from one station to another.
T.O. = ■■■ x (100mS)	Key is time out delay master station will wait for response before polling next station (100 mSec → 25.5 Sec max)
IF T.O. TX USR ■	If timeout occurs, transmit user message ■
IF ComEr TX USR ■	If a communication error occurs, transmit user message ■
CONTINUOUS 10e■	Poll continuously, or poll 1, 10, 100, 1000, or 10000 times before halting
RxTx Delay = ■■■■ ms	Key in the time delay between receiving a response to transmitting the next sequence.
FT-8N-SY-E-04800	Summary of blue key line parameters.

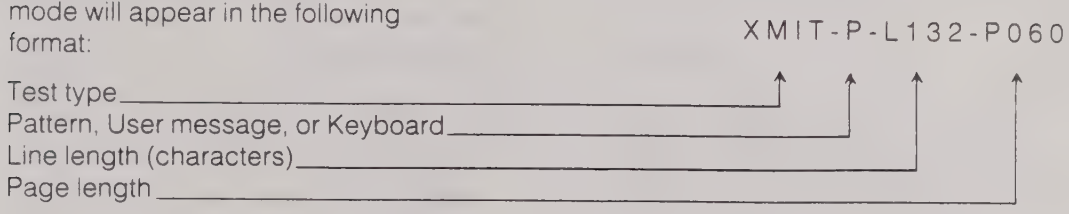
Separate polling worksheets have been provided with this manual. A permanent copy for photocopying purposes may be found in Appendix 6.

See section 5 for detailed examples of polling applications.

XMIT MODE

This mode has two main functions: First, it has been designed to thoroughly test printers and terminals. Secondly, it can function in an interactive manner, so that it may simulate a terminal. For printer and terminal testing, the user has the option of sending the Baudot, EBCD, ASCII, extended ASCII, or EBCDIC sliding character sets, or any user defined test message. Any of these test messages may be transmitted with selectable line length, new line characters, number of pads, pad character definition, page length, form feed character, number of pages, and definable flow control.

The upper line in the XMIT mode will appear in the following format:



As with all other test modes, the user selects the various XMIT parameters by stepping through the menu using the down cursor. As the down cursor is pressed, the lower line of the display will take the following format:

Display	Comment
FC-7E-A1-I-01200	Summary of blue key line parameters
PATTERN KEY usr	Select character set test pattern, interactive keyboard entry, or transmit a user message.
LINE LENGTH = 060	Number of characters/line, 0-255 max. If 0 selected, no carriage return-line feed.
NEWLINE = 0D 0A	New line characters. 0D 0A = ASCII carriage return line feed
# OF PADS = 3	0-9 max, 0 = no pads.
PAD CHARC = FF	Define pad character
PAGE LENGTH = 015	Number of lines/page (0-255 max). If 0 selected, no form feed.
FORM-FEED = 0C	Define form feed character. OC = ASCII form feed character
# OF PAGES = 002	Number of pages transmitted in test. 0-255 maximum. 0 = continuous transmission with no paging.
FLOW CONTROL = Y/**N**	Menu exits here if NO selected.
CHARC LINE PAGE	Define flow control boundary.
X-ON = 11 X-OFF = 13	Define flow control characters.
FC-7E-A1-I-01200	Return to parameter summary.

The XMIT mode permits more flexible flow control testing. In this mode, flow control can be set on a page, line or character boundary and the flow control characters are user definable.

As an illustrative example, consider testing a 60 column printer with the 7 level ASCII character set. If the menu selections were as shown above, the following printout would appear

Printed characters **Nonprintable characters**

```
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ01234567(CR)(LF)(Pad)(Pad)(Pad)
bcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ012345678(CR)(LF)(Pad)(Pad)(Pad)
cdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789(CR)(LF)(Pad)(Pad)(Pad)
defghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 (CR)(LF)(Pad)(Pad)(Pad)
efghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !(CR)(LF)(Pad)(Pad)(Pad)
fghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"(CR)(LF)(Pad)(Pad)(Pad)
ghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#(CR)(LF)(Pad)(Pad)(Pad)
hijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$(CR)(LF)(Pad)(Pad)(Pad)
ijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%(CR)(LF)(Pad)(Pad)(Pad)
jklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&(CR)(LF)(Pad)(Pad)(Pad)
klmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'(CR)(LF)(Pad)(Pad)(Pad)
lmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'((CR)(LF)(Pad)(Pad)(Pad)
mnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()(CR)(LF)(Pad)(Pad)(Pad)
nopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*(CR)(LF)(Pad)(Pad)(Pad)
opqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+(CR)(LF)(Pad)(Pad)(Pad)
pqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,(CR)(LF)(Pad)(Pad)(Pad)
qrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-(CR)(LF)(Pad)(Pad)(Pad)
rstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-.(CR)(LF)(Pad)(Pad)(Pad)
stuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./(CR)(LF)(Pad)(Pad)(Pad)
tuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:(CR)(LF)(Pad)(Pad)(Pad)
                                                                (FF)(Pad)(Pad)(Pad)
```

Printed characters **Nonprintable characters**

```
uvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;(CR)(LF)(Pad)(Pad)(Pad)
vwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<(CR)(LF)(Pad)(Pad)(Pad)
wxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=(CR)(LF)(Pad)(Pad)(Pad)
xyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>(CR)(LF)(Pad)(Pad)(Pad)
yzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?(CR)(LF)(Pad)(Pad)(Pad)
zABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@(CR)(LF)(Pad)(Pad)(Pad)
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[(CR)(LF)(Pad)(Pad)(Pad)
BCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\(CR)(LF)(Pad)(Pad)(Pad)
CDEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\](CR)(LF)(Pad)(Pad)(Pad)
DEFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^(CR)(LF)(Pad)(Pad)(Pad)
EFGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_(CR)(LF)(Pad)(Pad)(Pad)
FGHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`(CR)(LF)(Pad)(Pad)(Pad)
GHIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{(CR)(LF)(Pad)(Pad)(Pad)
HIJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|(CR)(LF)(Pad)(Pad)(Pad)
IJKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|}(CR)(LF)(Pad)(Pad)(Pad)
JKLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|}→(CR)(LF)(Pad)(Pad)(Pad)
KLMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|}→a(CR)(LF)(Pad)(Pad)(Pad)
LMNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|}→ab(CR)(LF)(Pad)(Pad)(Pad)
MNOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|}→abc(CR)(LF)(Pad)(Pad)(Pad)
NOPQRSTUVWXYZ0123456789 !"#$%&'()*+,-./:;<=>?@[\]^_`{|}→abcd(CR)(LF)(Pad)(Pad)(Pad)
```

To transmit a user message rather than a character set, select **usr** in the menu. Each user message will then be considered as one line. The CR LF and pad(s) will be added.

Consult 'Flow control' in this section for more information on that subject. See section 5 for detailed applications examples illustrating the use of the XMIT function.

Interactive XMIT mode

The interactive XMIT mode is selected by choosing the KEY entry when asked PATTERN KEY usr0. If KEY is chosen, the menu will exit back to the parameter set up summary.

To transmit an ASCII 'a' for example, key in the hex equivalent (61), followed by ENTER. The hex pair will be transmitted when ENTER is pressed. If an error is made while keying in the hex pair, you may clear out what has been keyed in by pressing CLEAR. Assuming the Datatest II Plus has been configured as a DTE, every character transmitted will appear in the top line of the display. Any received data will be displayed but ignored by the test set. Press HALT to stop the test.

As an example, if you wished to transmit "TESTING 123", then the following key sequence would be performed:

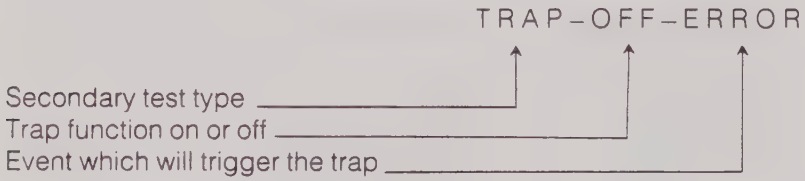
Step	Key(s) pressed	Comment
1	XMIT	Select transmit mode
2	down cursor	Select the choice "KEY"
3	down cursor	You will return to the parameter summary
4	RUN	Start the test
5	5, 4, ENTER	Transmit "T"
6	4, 5, ENTER	Transmit "E"
7	5, 3, ENTER	Transmit "S"
8	5, 4, ENTER	Transmit "T"
9	4, 9, ENTER	Transmit "I"
10	4, E, ENTER	Transmit "N"
11	4, 7, ENTER	Transmit "G"
12	2, 0, ENTER	Transmit space
13	3, 1, ENTER	Transmit "1"
14	3, 2, ENTER	Transmit "2"
15	3, 3, ENTER	Transmit "3"
16	HALT	Stops the test

Consult section 5 for detailed applications examples illustrating the use of the XMIT function.

SECONDARY KEY FUNCTIONS
Data trap

This secondary function may be run concurrently with any red key task with the exception of BERT transmitting pseudo random and ALT pattern data; and echo immediate (synchronous). It can trap on a variety of events and store 4094 characters of data as explained below. Trap contents may be transferred to a user message.

The upper line of the TRAP display will appear in the following format:



When first selected, the trap function will be off. Press the cursor down key to program the trap conditions. As the cursor down key is pressed, the lower display line will take the following format:

Display	Comment
OFF PRE CTR POS	Trap data prior to an event (PRE-event), on both sides of an event (CTR), or after an event (POSt-event).
ERROR E1M E1S SYNLOS USER2	Definition of event which triggers trap. Character string, error (see definition below), conductor patched to E1 going to the Mark or Space state, or a sync loss. If USER is selected, the device automatically traps on the receiving channel of the interface (DTE = RD, DCE = TD).

Test mode	Error definition
MON	framing error (async) or parity error (async or sync) or BCC error
BERT	bit error, block error, sync loss, parity error, framing error, BCC error
ECHO	not defined
POLL	unmatched response or communication error
XMIT	not defined

The user may scroll through the trapped data by pressing the right or left cursor keys. These keys will repeat at an increasing rate the longer they are held down. To go to the start of the buffer, press ENTER, followed by up cursor. To go to the end of the buffer, press ENTER, followed by down cursor. To move one complete display width (2 x 16 characters) press ENTER, followed by the left or right cursor key. Transfer of trapped data to a user message is done by using the user menu, and is discussed in that section. The trap indicator LED will illuminate when the trap is activated.

NOTE: When the Datatest II plus unit is on, pin 11 will always remain a mark (neg) condition until trap is activated. Then, pin 11 on the interface will output a 1 ms spacing (pos) pulse.

The trap accuracy is speed and function dependant. After the trap is activated, the cursor may be displaced by one or more characters. The following table gives typical accuracy values for 1200 bps and 19200 bps.

Trap event	Accuracy (1200 bps)	Accuracy (19200 bps)
Error (MON)	exact	exact
Error (BERT)	1 character late	8 character late
Error (POLL)	end of message	end of message
E1M	exact	exact
E1S	exact	exact
Sync loss	1 character late	8 character late
USER	exact	exact

The following trap examples assume that the ASCII character set is being monitored. Recall that if DTE is selected, the Datatest II Plus will trap on pin 3 data, and if DCE is selected, it will trap on pin 2 data.

Example #1: Trap = PRE, USR2, with DTE set
USR2 = 78 hex (x)

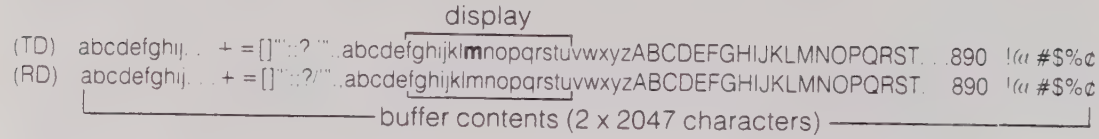
(first data character)

(TD) abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890 !@ #$%¢*()- + = [ ]"' .?/'"
(RD) abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890 !@ #$%¢*()- + = [ ]"' ?'"

display

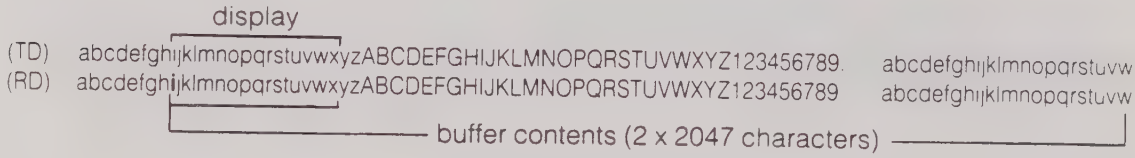
buffer contents (26 characters)

Example #2: Trap = CTR, USR3, with DCE set
USR3 = 6D 6E 6F (mno)


display
(TD) abcdefghıj. . + = [ ] " ' : ; ? ' " . . abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRST. . . 890 !@ #$%¢
(RD) abcdefghıj. . . + = [ ] " ' : ; ? / ' " . . abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRST. 890 !@ #$%¢
buffer contents (2 x 2047 characters)

(assuming 'mno' does not appear for at least 1024 characters)

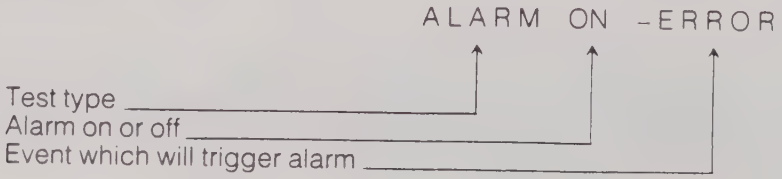
Example #3: Trap = POS, USR4, with DTE set
USR4 = 69 hex (i)



Alarm

This secondary function may be run concurrently with any red key task.

The upper alarm display line will
appear in the following format:



When first selected, the alarm function will be off. Press the cursor down key to program the alarm conditions. The lower display will take the following format:

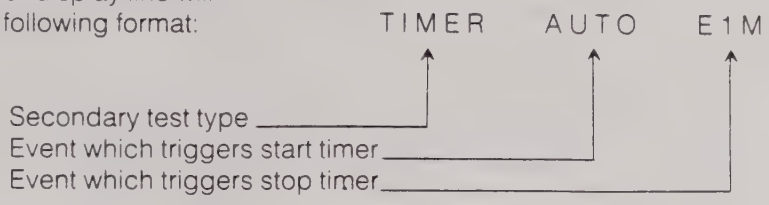
Display	Comments
ON OFF	Alarm on or off.
ERROR E1M E1S END SYNLOS	Alarm on error, conductor patched to E1 going to the mark or space state, test END, or sync loss.

Pressing the cursor down key again will return the display to primary red test function. The alarm will stop as soon as any key is pressed. The CLEAR key may be used to re-arm the ALARM function while a test is running.

Timer

This secondary function may be run concurrently with any red key task. The 5 digit counter will measure time delay up to 1.67×10^7 milliseconds between any 2 conductors changing state in any direction.

The upper timer display line will appear in the following format:



Press the TIMER key. Patch breakout box event pins E1 and E2 to the interface leads to be timed. To select the condition which will start the timer, press the cursor down key. If AUTO is selected, then the first of either E1 or E2 to change state will start the timer. Otherwise, select the condition, E1 or E2 marking or spacing, that is required. In the example above, after RUN is pressed, the device will sample the states of E1 and E2. Since AUTO is selected, the first one to change state will start the timer, and it will stop only when E1 goes to the mark state.

To program the stop timer condition, press the cursor down key again. Select the appropriate condition as before. Press the cursor down key a third time to return to the primary red test mode.

The timer function is automatically enabled whenever any primary red key task is performed. The test set will first indicate which of E1 of E2 changed state, in what direction, the time delay, and in what direction the other event pin changed state. The CLEAR key may be used to reset the timer.

Example #1: Measuring RTS-CTS delay

To measure RTS-CTS delay, the time interval between RTS turning on (spacing) and CTS turning on is measured. Set the timer for E1S, E2S, and patch E1 to RTS, and E2 to CTS. In this way, when RTS turns on, it will activate E1 and hence start the timer, while when CTS turns on, it will activate E2 and stop the timer.

Example #2: Measuring which of 2 conductors drops first.

In this test, 2 EIA leads which are normally on (spacing) will drop at almost the same time. We must determine which of the two dropped first, and the delay before the second drops. Set the timer for AUTO AUTO, and patch E1 and E2 to the leads to be observed. After RUN is pressed, press CLEAR. As soon as one of the leads changes state the timer will start, indicating which lead just turned off. When the second lead drops, the test will stop. The operator can see not only which lead dropped first, but also the total delay between them.

See section 5 for detailed timer related technical applications examples

Internal Diagnostics (TEST key)

The TEST key allows the user to perform detailed internal diagnostics. These can be used to verify the proper operation of the Datatest II Plus. Note that the breakout switches should all be closed during these tests. The first selection in the TEST menu is master reset. This erases all preprogrammed monitor, bert, echo, poll, xmit, trap, alarm, timer, and user selections. It should only be used to wipe out all memories for a master re-initialization. If a master reset is desired, press the RUN key twice. Otherwise, skip over the master reset by pressing the down cursor key.

The second test function is an interface test. This test exercises all drivers and receivers on the interface, and will note any failure(s) in the display. Ensure that all jumpers are removed and that there are no connections to the test set. To perform the test, press the RUN key, and to skip the test, press the down cursor key.

The next test is the special test, which checks the ± V supplies, the event pins, the mark/space monitor, and the passive breakout box LED's. When RUN is pressed, the display instructs the user to interconnect signals and verify expected results.

The display test verifies the proper operation of the LCD display. Run the test, and watch the display for any irregularities.

The keyboard test allows the user to check the actuation of every key.

The ROM test verifies that all EPROM's in the test set are programmed without error

The last test is the RAM test. It checks all the read-write memory. Note that this test must by necessity erase all pre-programmed values, as in the master reset.

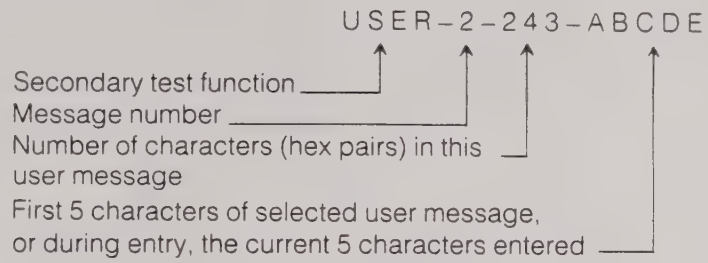
User messages

This key allows the operator to program 16 (0-F) distinct user messages. The maximum total length of all 16 messages together is 1023 characters. Each individual message has a maximum length of 999 characters. Messages may be entered in hex, or transferred from the trap buffer, but are displayed simultaneously in both hex and one of Baudot, EBCD, ASCII, EBCDIC or a user defined code. Note that this manual contains hex-Baudot, hex-EBCD, hex-ASCII, hex-EBCDIC, and symbol conversion charts in section 6.

Once USER has been pressed, select the message number by pressing the down cursor key followed by a light blue key, and continue using the cursor keys to select Baudot, EBCD, ASCII, EBCDIC or user. The user must then select whether the user message is to be generated from the keyboard, or from trapped transmit or receive data. If key (for keyboard) is selected, enter the user message in hex using the light and dark blue keys. Note that for local translation purposes, the Baudot, EBCD, ASCII, EBCDIC or user equivalent of the 5 hex pairs appears at the top right of the display. If TD or RD is selected, the trapped data is automatically transferred to the user message. Note that only that part of the last received trapped data from the start of the trap buffer to the extreme right of the display is transferred. The DEFINE selection is used to define a user programmable data translation table, for special data codes. See the next section entitled "USER DEFINED DATA CODES" for more information.

When the cursor is positioned over a letter, that hex pair may be cleared by pressing the CLEAR key. The CLEAR key operates in an auto repeat mode, so that by pressing and holding the key, multiple hex pairs may be rapidly deleted. Characters may be inserted in a message by using the enter key. Position the cursor on any character, press enter, and a null (hex 00) will be inserted in front of that character. Next, press the cursor left key and write over the null any hex pair desired.

Upper display line:


USER-2-243-ABCDE
Secondary test function
Message number
Number of characters (hex pairs) in this user message
First 5 characters of selected user message, or during entry, the current 5 characters entered

The lower line will take the following format as the down cursor is pressed.

Display	Comment
BUF REMAINS = 1023	Total # characters remaining in the user message buffer
MESSAGE NUMBER = X	Select the message number
ASCII EBCDIC EBCD BAUDOT usr0	Select the code of the message
KEY TD RD DEFINE	Enter data from the keyboard, transfer data from the transmit data buffer into the user message. transfer data from the receive data buffer into the user message, or define a user programmable data code.
41 - 42 - 43 - 44 - 45	The hexidecimal representation of the currently displayed 5 characters of the message. Characters may be deleted by pressing the CLEAR key. Characters may be inserted by pressing the ENTER key before keying in the hex pair
REPEAT: 9 TIMES	The # of times the message will be repeated **each** time it is accessed. If 9 was selected, one block of the message would be considered to be 10 repititions (1 original + 9 repeats). This means 1 user message can have an effective length of 9990 characters. 0 indicates no repetitions after the original.

The 16 user messages may be written here for reference.

USER0 . . . . . .

. . . . . .

USER1

USER2

USER3

USER4

USER5

USER6

USER7

USER8

USER9

USER A

USER B

USER C

USER D

USER E

USER F

To transfer data from the data buffer to a user message, select as the source the transmit buffer (TD) or the receive buffer (RD). Press the down cursor key. This will transfer all the data from the beginning of the buffer to the last displayed character into the user message. A maximum of 999 characters can be transferred. For a long message, it may take a few seconds to perform this function.

User defined data codes

The Datatest II Plus has 5 displayable data codes built in: hex, Baudot, EBCD, ASCII, and EBCDIC. In addition, there are user definable data codes which can be programmed once to store the translations for other possible codes.

User defined data codes are set up using the USER key. As discussed under USER MESSAGES above, one of the selections in the USER menu is a choice between KEY (enter data from the keyboard), TD (transfer data from TD to the user message), RD (transfer data from RD to the user message), or DEFINE. DEFINE then specifies the unique code translation for the user code. If DEFINE is selected, the new code is specified in the following manner:

If this hex pair is received from on line data:

USER-0-ADDR = OO : A
41 - 42 - 43 - 44 - 45 -

Then this hex pair from the LCD display truth table will be used to generate this alphanumeric character.

The LCD truth table is given below.

Lower hex \ Higher hex	Lower bit \ Higher bit	0	2	3	4	5	6	7	A	B	C	D	E	F
		0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
0	xxxx0000													
1	xxxx0001													
2	xxxx0010													
3	xxxx0011													
4	xxxx0100													
5	xxxx0101													
6	xxxx0110													
7	xxxx0111													
8	xxxx1000													
9	xxxx1001													
A	xxxx1010													
B	xxxx1011													
C	xxxx1100													
D	xxxx1101													
E	xxxx1110													
F	xxxx1111													

As an example, assume you wanted to translate a hex input 00 to a displayed 'A', 01 = 'f', 02 = '3', 03 = ']', and 04 = 'N'. In this case, the truth table would give the following translation:

Received hex data	Displayed character	Truth table hex
00	A	41
01	f	66
02	3	33
03	]	5D
04	N	4E

In addition, the display would appear like this:

USER-O-ADDR = OO : A
41 - 66 - 33 - 5D - 4E -

Truth tables for XS-3, IPARS, Reverse EBCD (both upper and lower case), and Selectric (both upper and lower case) are given in appendix 3.

Note that since these user display codes are lookup tables, they do not support upper/lower case shifting codes. For these codes, you may display upper **or** lower but not both within the same table.

Data rate accuracy

The Datatest II Plus allows programmable, internally clocked data rates up to 19.2 K bps (half duplex to 56 K bps). The accuracy of user keyed in data rates varies, generally decreasing for uncommon speeds as the baud rate increases (due to the increasing loss of resolution of the crystal controlled baud rate generator.)

The actual transmit data rate generated for any programmed speed may be calculated using the following formula:

$$\text{Transmit data rate} = \frac{1843200}{\text{integer}\left(\frac{1843200}{\text{programmed speed}}\right)}$$

The aforementioned limitations to data rate accuracy also apply to operation of the receiver at various baud rates. To ensure error free reception of data, the deviation at any programmed receive speed should not exceed 2%. The deviation may be calculated using the following formulae:

$$\text{Deviation (Asynchronous)} = \left[1 - \frac{\text{programmed speed}}{\frac{1.152 \times 10^5}{\text{integer}\left(\frac{1.152 \times 10^5}{\text{programmed speed}}\right)}}\right] \times 100\%$$

$$\text{Deviation (Synchronous)} = \left[1 - \frac{\text{programmed speed}}{\frac{5.76 \times 10^4}{\text{integer}\left(\frac{5.76 \times 10^4}{\text{programmed speed}}\right)}}\right] \times 100\%$$

*NOTE: If the Datatest II Plus is externally clocked, then the data rate accuracy for both the transmitter and receiver is soley dependent on the accuracy of the external clocking source.

CRC-CCITT, CRC-16, and LRC-8 calculation

The Datatest II Plus allows the user to monitor a data link and count the number of BCC (CRC-CCITT for BOP, LRC-8 for sync and async, or CRC-16 for bisync) errors in the data. In addition, BCC characters may be calculated and appended to a user message for use in testing. The function may be switched on or off. In BOP, BCC's are **always** checked.

For bit oriented protocols (BOP's) the polynominal used for the BCC is:

$$\text{CRC-CCITT} = X^{16} + X^{12} + X^5 + 1$$

For synchronous protocol, the polymonial is;

$$\text{CRC-16} = X^{16} + X^{15} + X^2 + 1$$

It is compatible with most bisync transparent or non transparent operations.

The following chart shows that the implementation of the BCC function for all modes.

Mode	BCC	Comment
MON	CRC-CCITT CRC-16 LRC-8	-must be in BOP protocol -must be in sync protocol, 7 data bits plus parity or 8 data bits -available in sync and async protocols
BERT	CRC-CCITT CRC-16 LRC-8	-must be in BOP protocol -must be in sync protocol, 7 data bits plus parity or 8 data bits -available in sync or async protocols
ECHO	CRC-CCITT CRC-16 LRC-8	-generated in buffered mode -generated in buffered mode -generated in buffered mode
POLL	CRC-CCITT CRC-16 LRC-8	-must be in BOP protocol -must be in sync protocol, 7 data bits plus parity or 8 data bits -sent on transmit and compared on receive -available in sync or async protocols -sent on transmit and compared on receive
XMIT	CRC-CCITT CRC-16 LRC-8	-not available -not avaialble -not available

As an example, if the synchronous BCC character were to be added to the 'fox' message, it would be calculated and appended as shown below.

(Sy)(Sy)(STX) THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 1234567890 (CR)(LF)(ETX)(BCC)

└──────── BCC calculated over these characters ────────┘

Note that BCC characters are always displayed on receive data but **never** on transmit data.

56 k bps testing

The Datatest II Plus supports 19.2 k bps for all modes and configurations with the following exceptions:

* Synchronous, 6 or 7 level, no parity: 14.4 bps
* Synchronous, BERT, fox message with BCC on **and** trap on user: 14.4 bps
* Synchronous, BERT, user message, with BCC on **and** trap on user: 9.6 k bps

56 k bps supported is limited to half duplex, for the monitor and BERT modes only. The following chart lists the permitted 56 k bps testing set ups.

Parameter	Monitor or Bert Modes
LINE	HALF
DTE/DCE	either
LEVEL	8 if no parity, 7 if parity
PARITY	none if 8 level, on if 7 level
PROTO	ASYNC 1 or 2 stop bits, SYNC, BOP
SYN	any 2 hex pairs
CLOCK	int or ext for SYNC or BOP, ext for ASYNC
CODE	ASCII or EBCDIC
SPEED	57,600 if internal clock, 0 if external
RTS/CTS	any
MESSAGES	Fox if BERT
BCC	on for BOP only
ALARM	On or off
TRAP	Off for user

A continuous BERT FOX message can be transmitted at 56 bps with the above configuration and set to continuous and simplex.

Note that the display will update very slowly at this rate.

Warning display messages

If interface conductors are in the improper state to send or receive data, a display message will appear to inform the user of the problem. In addition, there are several other messages possible, as defined below. The message will state the current condition which is forcing the test to hold.

XMIT HOLD CTS MK	(transmit hold, CTS is marking but must be spacing)
XMIT HOLD DTR MK	(transmit hold, DTR is marking but must be spacing)
XMIT HOLD CD SP	(transmit hold, CD is spacing but must be marking)
RECV HOLD CD MK	(receiver hold, CD is marking but must be spacing)
XMIT HOLD RTS SP	(transmit hold, RTS is spacing but must be marking)
RECV HOLD RTS MK	(receiver hold, RTS is marking but must be spacing)
BATTERY LOW	(a.c. must be applied or the device will shut off)
USER ■ UNDEFINED	(the user message required to run the test is undefined)
8 LEVEL MK PARITY	(illegal level/parity combination)
8 LEVEL SP PARITY	(illegal level/parity combination)
SYN/BOP NOT FDX	(in immediate ECHO, receiving synchronous data, the test set must be set for full duplex)
Speed = 0:INT CLK	(With internal clock, speed must not be zero)
Speed = 0:DCE	(As a DCE, speed cannot be 0. Note that for DTE, external clock, speed = 0 disables XTC on pin 24)
BUFFER OVERFLOW	(incoming external clock exceeds specified system rate, test terminated)
POLL SETUP ERROR	(none of the 7 poll conditions has an action that retransmits the initial poll message)
NO USER FOX MESS	(for code = usr, there is no canned 'FOX')
CRC on 8L PARITY	(CRC's cannot be calculated on a 9 level (8 +parity) code)
CRC ON 7L NO PAR	(CRC's cannot be calcualted on a 7 level code with no parity)
CRC ON 5/6 LEVEL	(CRC's cannot be calculated on 5 or 6 level codes)
NO 5 LEVEL SYNC	(synchronous 5 level is not supported)
NO USER PATTERN	(for code = usr there is no XMIT pattern)
ASYN 1.5 EXT CLK	(async 1.5 stop bits external clock is not possible)
NO XMIT KEY BOP	(BOP protocol is not supported in the XMIT mode)
LRC: ASCII ONLY	(LRC is supported in ASCII code only)

Battery information

When batteries are low, the device generates several "low battery" warning messages. If this happens, "low battery" will be displayed, and the beeper will sound. Press any key to stop the beeper, and then connect the a.c. adapter. If a.c. power is not applied, several more warnings will appear, and then the unit will turn itself off.

The test set will always retain enough voltage to protect individual menu parameter selections, preprogrammed poll addresses, and user messages. The unit will also shut off if it is not in the RUN mode and a key has not been pressed for 10 minutes.

A completely discharged Datatest II Plus requires 16 hours charging with the power off to re-gain full battery power.

INPUT/OUTPUT MODE

The Input Output option adds 3 new functions to a Datatest II Plus:

1) Remote transfer from one box to another of:
   - all red key set ups and blue key settings including user messages, or
   - all memories including result counters and data buffers

2) Output to a serial printer either:
   - all red key set ups and blue key settings including user messages or
   - the results of the last run test including the setup, user messages, counter, and contents of the data buffer (in both hex and english)

3) With the optional Program or Data RAM Packs, the user has the ability to store setups user messages, and the captive buffer of a Datatest II+. Furthermore this information can be later reloaded (up to 3 years away) into any Datatest II+ in just a few seconds. The Program Pack will store the combined setups equal to 4 different Datatest II+ test sets. The Data Pack will store the setups and capture buffer of one Datatest II+test set.

Operation

All input functions (receive from another test set or load from a RAM Pack) are performed using the ECHO key. All output functions (send to another test set, program a RAM Pack, or output to a printer) are performed using the XMIT key.

To access the I/O input function, depress the ECHO key twice. Select either RECEIVE (input setups from another DT II+) or LOAD (input setups and/or capture buffer from a RAM Pack). When using the RECEIVE function, the line parameters can be changed as necessary to correspond to the transmission link. However, if the LOAD function is used, the operational parameters are set internally, hence all information on the bottom line of the LCD is irrelevant. Depressing RUN performs the input function.

To access the I/O output function, depress the XMIT key twice. Three possible selections can be made: SEND (output data to another DT II+), PROG (output setups and/or capture buffer to a RAM Pack), or PRINT (output data to a printer or terminal).

When PRINT is selected, the menu allows the user to print either the "SETUPS" of all the DT II+ parameters, or the "RESULTS" of the last primary function used. When "SEND" is chosen, the user can select to transmit the "SETUPS" only, or "ALL" setups and data form the capture buffer. In SEND mode, the line parameters can also be changed as necessary to correspond to the transmission link. In PROG mode, the operational parameters are set internally, hence all information on the bottom line of the LCD is irrelevant. Insure that the RAM Pack is properly seated on the DT II+ before programming. When transmitting to the RAM Pack, you must disable the write protect by placing a jumper from +V to EI on the DT II+. Failure to do so will result in an error message on the LCD.

Refer to the I/O Setup Menu for a summary of all setup selections.

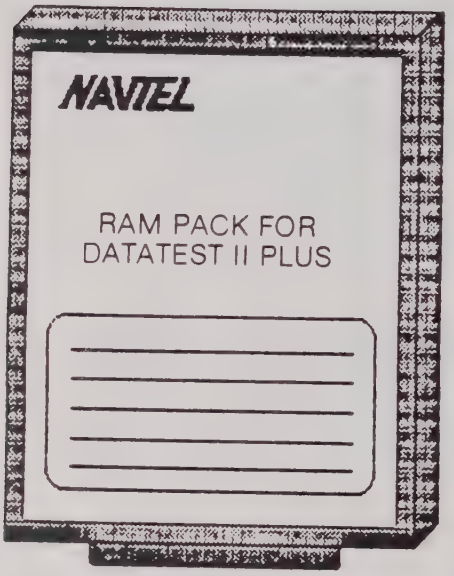
Using RAM Packs

The Program Pack allows the user to permanently store all set ups (4 groups) in the device, specifically:

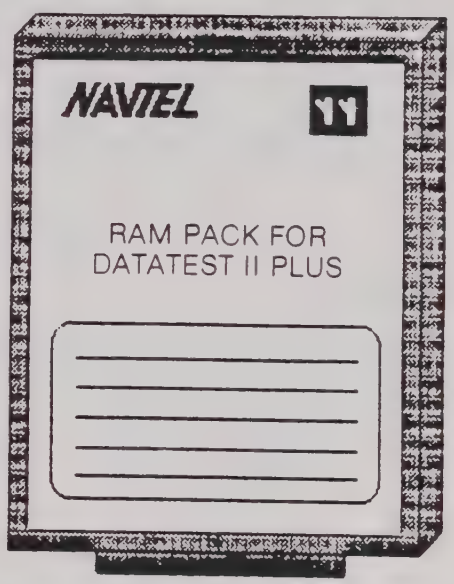
- the MON set up
- the BERT set up
- the ECHO set up
- the POLL set up
- the XMIT set up
- all optional set ups if applicable (X.25, distortion, etc.)
- the TRAP set up
- the ALARM set up
- the TIMEr set up
- the USER message

The Program pack will **not** store result counters or data buffers, although data may be saved by first transferring it to a user message. All RAM Packs are non-volatile and will retain their contents until either deliberately erased or the battery needs replacing (minimum 3 years battery life).

The two types of RAM Packs. Program and Data are shown as follows:



DATA PACK



PROGRAM PACK

The Program Pack differs from the Data Pack in that it has 2 switches in the upper right corner. These switches are used to select the active memory bank for programming or loading. Each of the four possible states (00, 01, 10, 11) individually represents the storage capability of one DT II+. Figure 1 shows the Program Pack set with the 11 bank active. You may wish to label the stored set ups in a similar manner. e.g.

00 dumb terminal tests
01 stat mux tests
10 212 modem tests
11 3270 bisync tests

In use, the RAM Pack is plugged into either the DTE or DCE connectors of the Datatest II Plus. A.C. power should be applied if batteries are not charged.

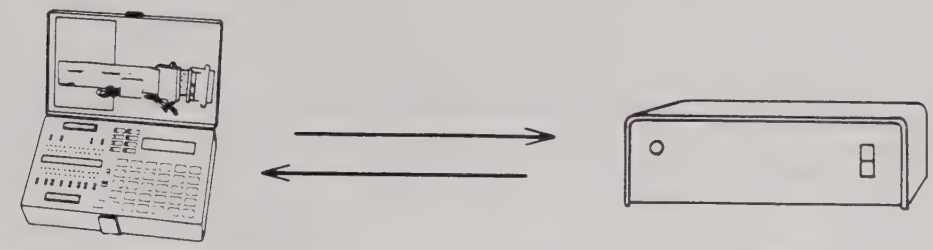
The input output function is further described in various applications given in the next section.

SECTION 5 - Applications

Modem Testing - Analog Loopback

Application: Tests EIA decoder/drivers, modulator, and demodulator sections of a local modem.

Setup: Connect the Datatest II Plus to the modem as shown.



DATATEST II PLUS MODEM (DCE)

Procedure:

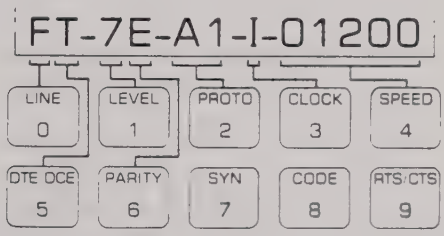
Step 1: Connect the Datatest II Plus (DCE connector) to the modem.

Step 2: On the modem, press the switch marked AL or LL. This places the modem in analog loopback.

Step 3: Apply power to the test set by pressing the ON/OFF key.

Step 4: After the selftest, press the red BERT mode key.

Step 5: Use the light blue (0-9) keys to match the test set to the operating characteristics of the modem. The lower display line summarizes this information as shown. The possible parameter selections are given below.

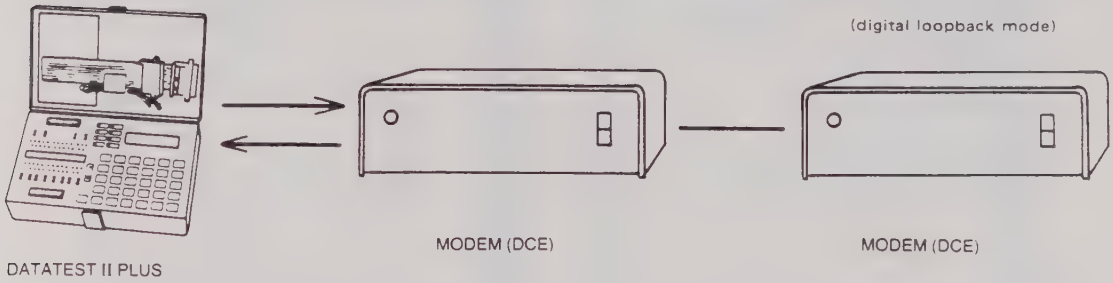


Line: FULL duplex, HALF duplex, MULTIdrop
Level (number of data bits per character): 5 LEVEL, 6 LEVEL, 7 LEVEL, 8 LEVEL
Proto (protocol): Async, Sync, BOP
Clock: INTernal, EXTernal
Speed: Transmit and receive data rates keyed in by user
DTE/DCE: dTe or dCe simulation
Parity: Odd, Even, Mark, Space, None

Modem Testing - Digital Loopback

Application: Tests local modem, communication channel, and equalizers, modulator, and demodulator of remote modem.

Set up: Connect the Datatest II Plus to the local modem as shown.



Procedure:

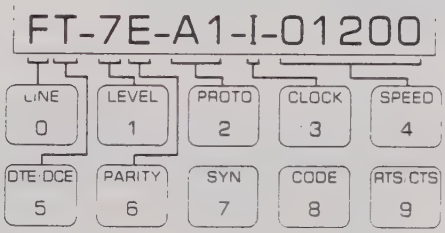
Step 1: Connect the Datatest II Plus (DCE connector) to the modem.

Step 2: On the remote modem, press the digital loopback switch normally marked DL

Step 3: Apply power to the test set by pressing the ON/OFF key.

Step 4: After the selftest, press the red BERT mode key.

Step 5: Use the light blue (0-9) keys to match the test set to the operating characteristics of the circuit. The lower display line summarizes this information as shown.



Step 6: Use the green cursor keys to select the test parameters (message type, number of blocks/test) which are summarized in the upper display line.

Step 7: Press RUN.

Use the cursor keys to scroll through the following results: bit errors, bits received, block errors, blocks received, error free seconds, errored seconds, framing errors, BCC errors, sync losses, timeouts, and BERT and BLERT calculations. Errors may be injected one per block by pressing the INSERT ERROR key. To stop the test and review the test results, press the HALT RESULT key.

Successful Test Indications

If both modems and the communications channel are functioning correctly, the sync indicator will be on, and the display will indicate the number of bits and bit errors received. The sync indicator will illuminate for both synchronous and asynchronous modems. Normally, there should be either no errors or at worst very occassional errors, depending upon the modems and communication channel used. In most cases, if a component is defective there will likely be a large number of errors. A less common possibility involves receiving a regular number of errors repeatedly at fixed intervals. This suggests a clocking problem, in which case the timing source should be checked. One error per block may be injected into the data stream by pressing the Error Insert key. Note that a successful test does not guarantee that the remote modem's EIA decoder/drivers are functioning properly. These can be tested with an end to end test, or an analog loopback test at the remote end.

Unsuccessful Test Indications

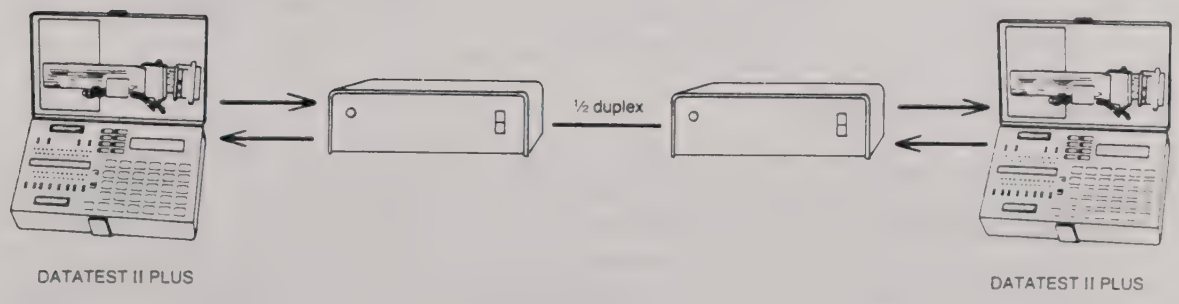
If the test was unsuccessful, the sync indicator will not have illuminated, and/or errors will have been received. If this occurs, check the set up to ensure all connections are solid and the data rate and mode of the test set match the operating parameters of the modem, and try the test a second time.

If the test still fails, verify that RD is flashing. If it is not active, then no data is being received. If this is the case, check to ensure that the remote modem is in digital loopback, and if necessary perform an analog loopback test on the local modem. For synchronous modems, verify that TC and RC are active.

Modem Testing - End to End Half Duplex Circuits

Application: To test a switched carrier half duplex point to point circuit. This test will verify proper carrier switching, as well as perform error rate analysis. Two Datatest II's Plus are required, unless another compatible test set is available.

Setup: Connect the Datatest II's Plus to the modems at either end as shown.



Procedure:

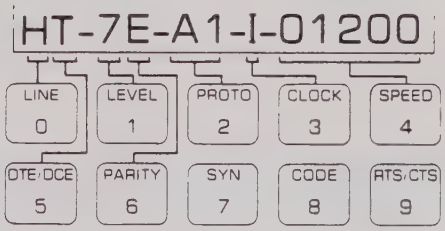
Step 1: At both ends, connect the Datatest II Plus (DCE connector) to the modem.

Step 2: Set both modems for normal operation.

Step 3: On both test sets, press the ON/OFF key. The following steps apply equally to both test sets.

Step 4: After the selftest, press the red BERT mode key.

Step 5: Use the light blue (0-9) keys to match the test set to the operating characteristics of the circuit. The lower display line summarizes this information as shown. Note that for the test, a half duplex line must be selected.



Step 6: Use the green cursor keys to select the test parameters (message type, and block count) which are summarized in the upper display line. Note that for this test, the same message at both ends must be selected, as well as the same block count. If continuous is selected, the test will be simplex. Particularly effective is a short (8 or 9 character) user message for rapid line turnaround.

Step 7: On both test sets, press the RUN key. This puts each test set into the receive mode On either test set, press the RUN key again. This will put that tester into the transmit mode, and the testing will begin.

Use the cursor keys to scroll through the following results: bit errors, bits received, block errors, blocks received , error free seconds, errored seconds, sync losses, time outs, and BERT and BLERT calculations. Errors may be injected one per block by pressing the INSERT ERROR key. To stop the test and review the test results, press the HALT RESULT key. The carrier switching may be noted by observing the breakout LEDs.

Successful Test Indications

If the circuit is operating properly, both test sets will have illuminated sync indicators and be showing no errors detected. Due to the carrier switching and the possible RTS-CTS delays, it is possible for the display to flicker occassionally, as messages may be written in the display and immediately erased if a conductor is momentarily in the incorrect state. Errors injected at one end by pressing the Error Insert key will be detected at the other end. Note that errors can be injected only while transmitting.

Unsuccessful Test Indications

If the test was unsuccessful, one or both sync indicators will not have illuminated, the sync loss indicator, may be on, and/or a significant number of errors will have been received. If this occurs, check the set up to ensure all connections are firm, that both test sets are programmed correctly, and that their settings match the operational characteristics of the network. Try the test a second time.

If the test still fails, check the key interface signals. If the test starts and stops, if may be that the modems cannot turnaround the line fast enough. To test for this condition, try the test again, with a longer message (FOX or 511 for example).

If the test yields a high bit error rate, this normally points to one of two problems. First, the modem equalizers may require adjustment, and secondly, the telephone line may be in a degraded condition. Several further testing techniques may be tried depending upon whether the service is dial up (2 wire) or private line (4 wire).

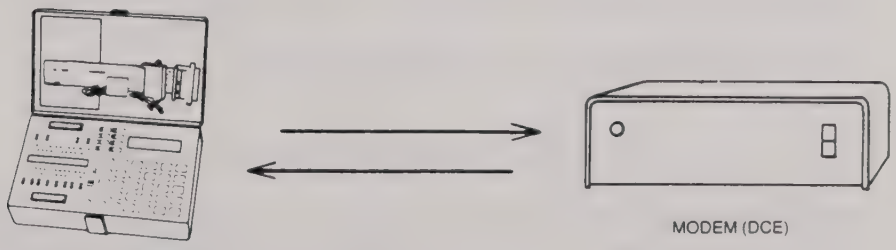
If the service is dial up, try dialing a new line. Should the problem persist, try sending data in one direction only. This tests one modem's transmitter equalizer and the other's receive equalizer. Another test could be to change the message to the ALT pattern, or a user message, to see if the modem's are data sensitive. Still another test involves hanging up and calling a third modem. If this works, its likely that your local modem is O.K. Similar tests can be run from the remote end.

If the service is 4 wire private line and a high bit error rate occurs, strap the modems for full duplex, and use the full duplex testing techniques already described, to determine if carrier switching is the problem.

MODEM TESTING - RTS - CTS DELAY MEASUREMENT

Application: To measure the delay in milliseconds between the raising of RTS by the Datatest II Plus and the return of CTS from a modem. The test is normally run concurrently with a BERT test.

Setup: Connect the Datatest II Plus (DCE connector) to the modem as shown.



Step 1: Connect the Datatest II Plus to the modem, and set the modem for normal operation.

Step 2: Press the On/OFF key of the Datatest II Plus.

Step 3: After the selftest, press the BERT key, and proceed to set up the tester for a bert test as previously described.

Step 4: Press the TIMER key. Use the cursor controls to select E1S and E2S. This will cause the tester to measure the delay between the signal connected to E1 spacing, and the signal connected to E2 spacing.

Step 5: Patch E1 to RTS, and E2 to CTS on the breakout box.

Step 6: Press the RUN key.

Error analysis may be observed as before. To note the delay time, press the down cursor key Delays up to 1.67×10^7 milliseconds may be measured.

Successful Test Indications

Shortly after RTS is raised, CTS will respond, and the display will indicate the delay measured. The CLEAR key may be used to repeat the measurement.

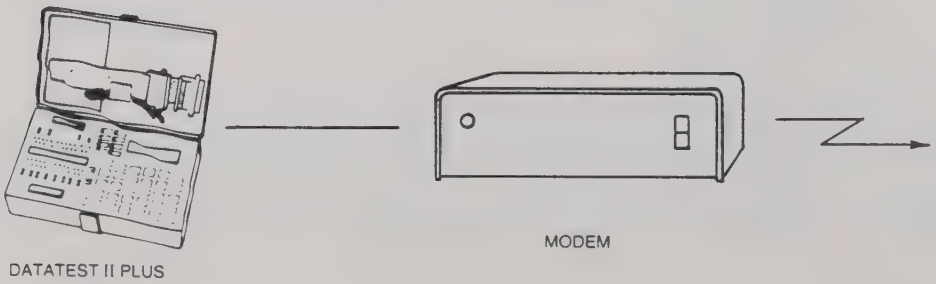
Unsuccessful Test Indications

The test was unsuccessful if CTS did not go high following RTS. This will be noted by the breakout box LED indicator, as well as the LCD display. The test may also reveal that the RTS - CTS delay is not what was expected. This may usually be adjusted by a dip switch or strap within the modem. Consult the modem manual if in doubt.

Synchronous clock slippage detection

Application: This test determines whether or not the transmit and receive clocks of a synchronous circuit are not exactly the same frequency. This method does not require the use of an oscilloscope.

Setup: Connect the Datatest II Plus to the circuit as shown.



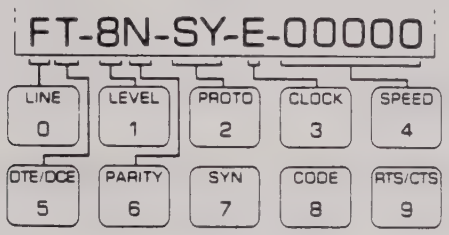
Procedure:

Step 1: Open all breakout switches except for 1, 7, 15, and 17.

Step 2: Connect the circuit (modem, patch panel, multiplexer, etc) to the **DCE** connector of the Datatest II Plus, using the RS-232C ribbon cable.

Step 3: Turn on the test set, and select the BERT mode.

Step 4: Use the light blue keys to match the test set's lower line display to the one shown below.



Step 5: Press the SYN key, and check that it is set for 32 - 32.

Step 6: Press the CODE key, and check that it is set for EBCDIC.

Step 7: Press the down cursor key, and select the FOX message, with continuous transmission.

Step 8: Using a 3 way patch cord, connect +V to pin 5 (CTS) and pin 8 (CD) on the **DTE** (lower) side of the breakout box.

Step 9: Using a 2 way patch cord, connect pin 2 (TD) to pin 3 (RD) on the **DTE** (lower) side of the breakout box.

Step 10: Press RUN.

Step 11: Press the down cursor key until the sync loss counter is displayed.

The test set is looping back the fox message to itself, using the network s clocks to drive its own transmit and receive data. If the clocks are drifting in relation to each other, that is if their frequencies are not exactly the same, then sync losses will be counted. In this case, sync losses will occur every time the clock edges move out of phase with each other by 360°. Note that the time delay between successive sync losses will be constant, and will be equal to the reciprical of the beat frequency. In other words, if sync losses occur every 10 seconds, then the clocks differ by 0.1 Hz.

Storing results of a test for later review

Application: Occasionally there is a requirement to save the results and buffer contents of a particular test, in order that they may be reviewed later, or shown to someone who may have more insight into the problem studied.

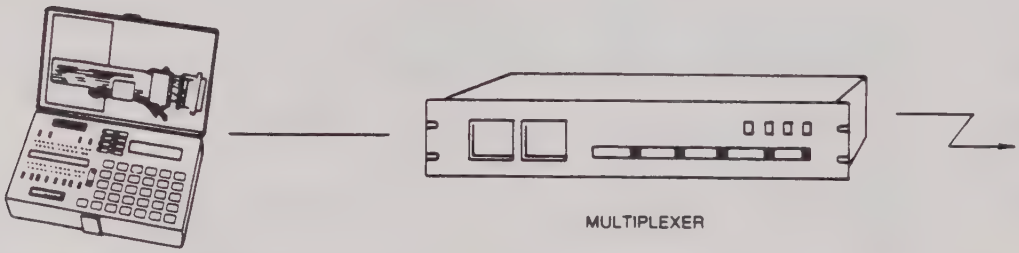
Procedure: The Datatest II Plus **automatically** stores in protected memory, after every test, the following information: the contents of the 4 K buffer, all the result counters for the last run test, and the most recent combination of line parameters set for all modes

Hence, to store the results of a particular test, simply press the HALT key, and turn the unit off. When it is powered on again, press the HALT key again, and the stored results will appear. Be sure **not** to press the RUN key in the meantime, since the most recently run test's results are saved.

Transmission of only one block of data

Application: To send a single message and monitor for a response. This could be used to down load set up a multiplexer, or other similiar devices.

Set up: Connect the Datatest II Plus as shown below.



DATATEST II PLUS

Procedure:

Step 1: Apply power to the test set, and select the USER key.

Step 2: Enter the message to be transmitted in the appropriate code, (which will depend upon the application).

Step 3: Select the BERT mode.

Step 4: Using the light blue keys, match the test set to the operating characteristics of the circuit. Be sure to set the LINE for **half** duplex.

Step 5: Press the down cursor key, and select the appropriate user message, with 10e0 block transmission.

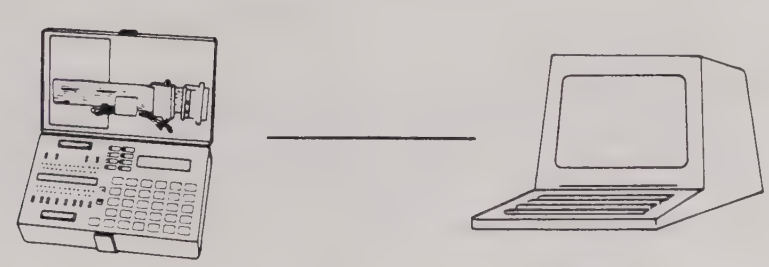
Step 6: Press the RUN key

The test set will transmit the message required, and then will wait. The display will indicate the response, if any. Press HALT to stop the test

CRT terminal screen alignment

Application: To generate a test pattern which can be used to check and modify if necessary the alignment of a CRT terminal. This test is intended for 'dumb' terminals.

Set up: Connect the Datatest II Plus to the terminal as shown.



Procedure:

Step 1: Turn the test set on, and press the USER key.

Step 2: Select USER9, ASCII, KEY, and then key in 2B in hex. This should cause the '+' symbol to be shown in the upper right hand corner of the display.

Step 3: Press the BERT key.

Step 4: Using the light blue keys, match the test set to the operating characteristics of the terminal. Be sure to select DCE simulation.

Step 5: Press the down cursor key, and select USER9, with continuous transmission.

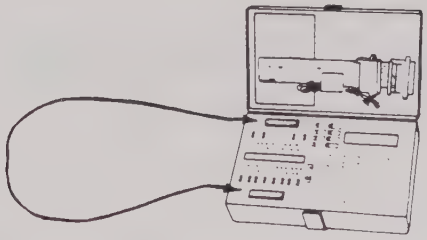
Step 6: Press the RUN key to start the test.

The CRT screen should fill up with a pattern of + symbols. Press HALT. This pattern gives a horizontal and vertical grid which will allow the operator to check for any display regularities. It can also be used as a reference for readjusting the screen.

RS-232C cable testing

Application: In many instances data communications problems are due to faulty cables. This test allows the user to verify that the following pins are connected properly in an RS-232C cable: 2, 3, 4, 5, 6, 8, 15, 17, 20, and 24.

Set up: Connect the cable to the Datatest II Plus as shown



RS - 232C CABLE

DATATEST II PLUS

Procedure:

Step 1: If the cable is male - male, connect it directly to the connectors of the Datatest II Plus. If it is male - female, connect the tester's ribbon cable in between at either end If the cable is female - female, another good male - male cable is required

Step 2: Open all breakout switches except for 1 and 7.

Step 3: Turn the test set on, and press the TEST key.

Step 4: Press the down cursor key, so that INTERFACE TEST is shown.

Step 5: Press RUN twice.

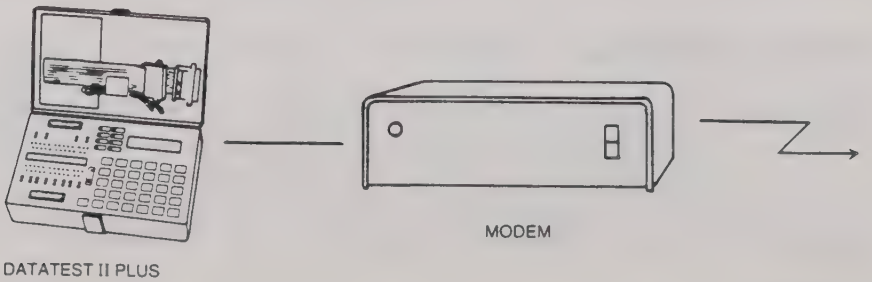
The Datatest II Plus will attempt to drive and receive on all the key interface signals. If any tested pin is open, it will identified in the display. If the tested pins were connected properly, the display will show INTERFACE TEST COMPLETED.

To test the less frequently used pins, connect one jumper between the DTE side of the pin and +V, and another jumper from the DCE side to the mark/space monitor. If the connection is good, the monitor should illuminate red.

Dumb terminal simulation

Application: Using the Datatest II Plus to enter character data either remotely or directly to a local device.

Set up: Connect the Datatest II Plus as shown.



MODEM

DATATEST II PLUS

Procedure:

Step 1: Turn on the test set, and select the XMIT mode.

Step 2: Use the light blue keys to match the test set to the operating characteristics of the network.

Step 3: Press the down cursor, and select KEY. Press the down cursor again to exit back to the parameter set up summary.

Step 4: Press the RUN key to start the test.

Step 5: Use the blue keys to key in a hex pair, and then press ENTER to transmit it. For example, to send an ASCII 'a', key in 6, 1, ENTER.

Data transmitted should be visible in the display. Received data will be shown but ignored by the test set. Press HALT to stop the test.

Compatibility with uncommon character codes

Application: This application shows how to use the Datatest II Plus to communicate with or monitor data from a device not compatible with Baudot, EBCD, ASCII, or EBCDIC.

Set up: Connect the Datatest II Plus as shown.

Procedure:

Step 1: If the code to be used is XS-3,IPARS, Reverse EBCD, or Selectric, then consult the Datatest II Plus Operators Manual under **User defined display codes** and follow the instructions for entering the new display matrix. If the code is none of the above, obtain a hex breakdown of the code and consult the manual as above.

Step 2: At this point, the Datatest II Plus should be compatible with the new code. Select the desired testing mode.

Step 3: Set up the test in the normal way, but select **usr** under the CODE key

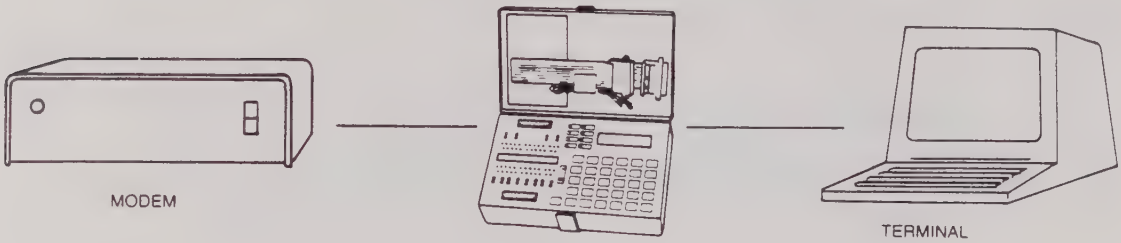
Step 4: Press the RUN key to start the test.

The Datatest II Plus should be able to transmit in the new code, as well as analyze incoming data. See the Operators Manual for more information.

DATA MONITORING AND DISPLAY

Application: To allow the operator to monitor the data traffic on an active circuit. Data may be viewed on the transmit, receive, or both sides of the interface. The test set will display data in hex, Baudot, EBCD, ASCII, EBCDIC, or a user defined code

Set up: Connect the Datatest II Plus in line as shown.

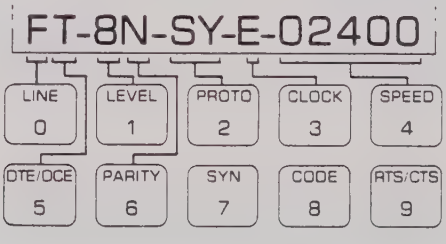


Procedure:

Step 1: Connect the Datatest II Plus as indicated.

Step 2: Press the ON/OFF key. After the selftest, the unit will automatically select the MON mode.

Step 3: Use the light blue (0-9) keys to match the test set to the operating characteristics of the circuit. The lower display line summarizes this information as shown.



Step 4: Use the cursor keys to select the test parameters which are summarized in the upper display line. Note that for this test, either or both sides of the interface may be monitored, one selected character may be suppressed, and the imbedded sync character may be suppressed. Note that if both TD and RD are monitored, they are (approximately) time synchronised in the display with time fill characters.

Step 5: Press the RUN key to begin monitoring.

The upper line of the display will indicate pin 2 (normally transmit data), while the lower line displays pin 3 (normally receive data). By pressing the down cursor key, the user may scroll

through the counters, which include transmit and receive bytes, frames, parity errors, and BCC errors. Note that BCC errors are **always** measured when monitoring a bit oriented protocol (SDLC, HDLC). BCC errors may be measured for bisync data only if the data is 7 data bits plus parity **or** 8 data bits **and** if BCC's are enabled.

Successful Indications

If the test set is monitoring correctly, data should be visible in the display.

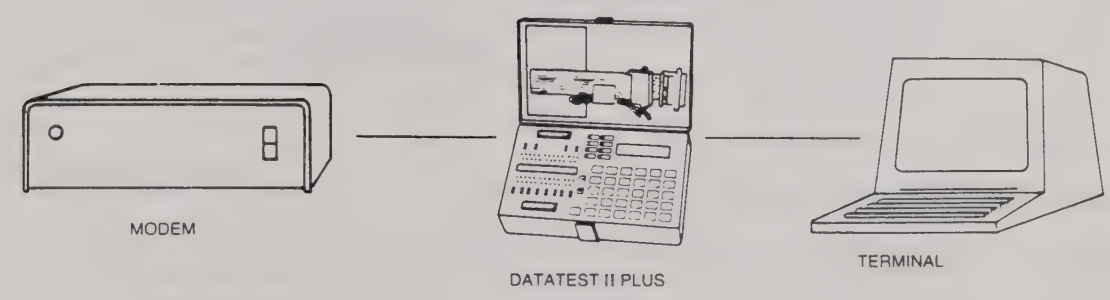
Unsuccessful Indications

If the test set is monitoring incorrectly, either no data, or garbled data will be visible in the display. Check the level, parity, code, and protocol. Also ensure that data is present by checking the breakout box LEDs.

DATA TRAP

Application: To trap and review 4094 characters of data before, in the center of, or after an event occurs. An event is defined as any user defined character string on the transmit or receive lines, an error, a sync loss, or any interface conductor changing state.

Set up: Connect the Datatest II Plus in line as shown.



Procedure:

Step 1: This test is normally performed while monitoring data, but can also be run concurrently with BERT (only with FOX or USER messages), ECHO, POLL, or XMIT tests. For purposes of illustration, assume that it is to run while monitoring data. Therefore, set up the test set as described under Data Monitoring and Display.

Step 2: Press the TRAP key.

Step 3: Using the cursor controls, select whether data is to be trapped before, on both sides of, or after an event.

Step 4: Select the definition of the event for this test

Step 5: Press the RUN key.

Trapping on error has different meanings depending upon the mode of operation. See the operation section of this manual for more information.

If the Datatest II Plus is configured as a DTE, it will trap on pin 3, and if it's a DCE, it will trap on pin 2 (i.e. the receiving channel of the interface). When an event occurs which activates the trap, the trap indicator will illuminate at the same time it will send out a pulse on pin 11. If data is trapped while in the MON mode, the test will halt on trap. For BERT, ECHO, POLL, and XMIT the tests will continue after the trap is activated. For those tests, the user may review the trapped data by pressing the RESULT key.

TERMINAL TESTING

Application: To verify the proper operation of a standard or 'dumb' terminal. This test will test both the receive and transmit circuits of the terminal.

Set up: Connect the Datatest II Plus (DTE connector) as shown.

Procedure:

Step 1: Connect the Datatest II Plus to the terminal.

Step 2: Press the ON/OFF key.

Step 3: After the selftest, press the ECHO key.

Step 4: Use the light blue (0-9) keys to match the test set to the operating characteristics of the terminal. The lower display line summarizes this information as shown.

Note that DCE simulation should be selected.

Step 5: Using the cursor controls, select buffered echo and a 0D (hex for ASCII carriage return) messager delimiter.

Step 6: Press the RUN key.

Step 7: Key the alphabet into the terminal, and on the terminal, press return (or enter if appropriate)

As characters are typed into the terminal, they will be visible on the Datatest II Plus display When return is pressed, the information keyed into the terminal (and hence to the Datatest II Plus) will be transmitted back to the terminal, and should be displayed on the CRT To test high speed data reception by the terminal, set the Datatest II Plus in the BERT mode (DCE simulation), and send the FOX message to the terminal. Alternatively, the XMIT mode may be used to transmit the printable ASCII character set.

Successful Test Indications

If the test is operating properly, both the terminal and the Datatest II Plus should have displayed valid data characters.

Unsuccessful Test Indications

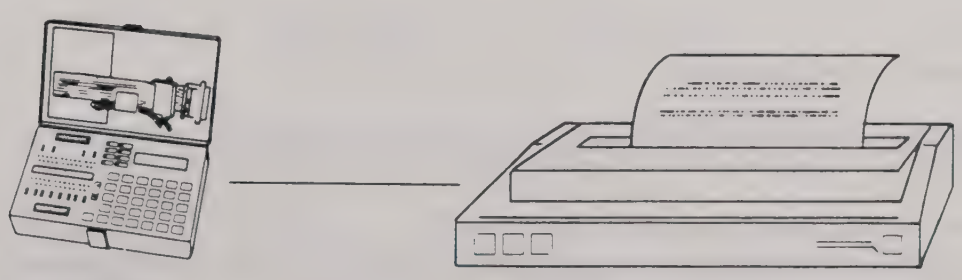
If the test is unsuccessful, nothing will appear on the screen. Review the test procedure again, and check the connections between the devices. Try the test a second time.

If the test still fails, consult the terminal manual to ensure the terminal does not require any special control signals or addresses for normal operation. If it is an intelligent terminal, you may require the use of a special user message. Double check to be sure the speeds and parity are set correctly on both devices.

PRINTER TESTING

Application: To test a a RS-232 serial printer. This test features the XMIT mode, which was designed specifically for this application. If the printer is non-RS-232, an interface adapter will be required.

Set up: Connect the Datatest II Plus to the printer as shown.



DATATEST II PLUS

PRINTER

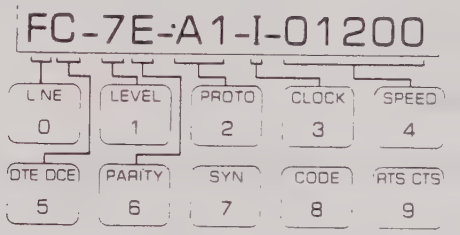
Procedure:

Step 1: Connect the Datatest II Plus to the printer

Step 2: Press the ON/OFF key.

Step 3: After the selftest, press the XMIT key.

Step 4: Use the light blue (0-9) keys to match the test set to the operating characteristics of the terminal. The lower display line summarizes this information as shown.



Note that DCE simulation, 7 level, and ASCII code should be selected.

Step 5: Use the cursor keys to select the desired line length, new line characters, number of pads, pad character definition, page length, and form feed character

Step 6: Press the RUN key.

The printer should be printing the ASCII character set in the manner programmed. By varying the test parameters, the printer may be exercised thoroughly. Note that flow control may be tested using XON/XOFF or any other characters, on a character, line, or page boundary.

Successful Test Indications

If the test is operating properly, the test message will be continually printed.

Unsuccessful Test Indications

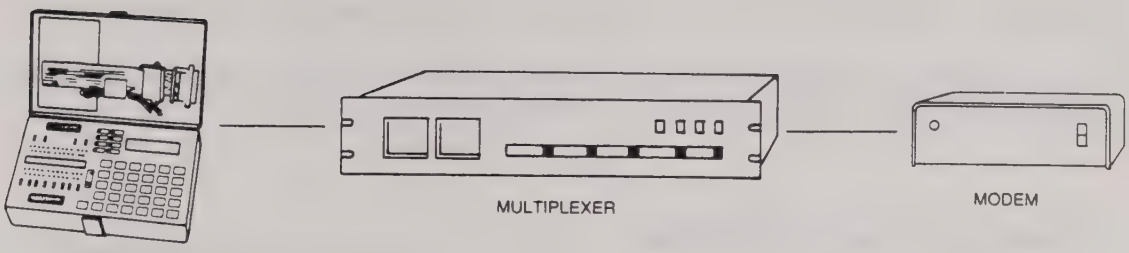
If the test is unsuccessful, nothing will print. Check the key EIA leads. Review the test procedure again, and check the connections between the devices. Try the test a second time.

If the test still fails, consult the printer manual to ensure the printer does not require any special control signals or addresses for normal operation. Double check to be sure the speeds and parity are set correctly on both devices.

TIME DIVISION MULTIPLEXER TESTING

Application: To verify the proper operation of a time division multiplexer. The example given here deals with local testing. Remote testing procedures would be performed by following logical extensions to the test procedure, and 2 test sets could be used to determine the direction of incorrect data transfer.

Set up: Connect the Datatest II Plus to the time division multiplexer (henceforth called TDM) as shown.



Procedure:

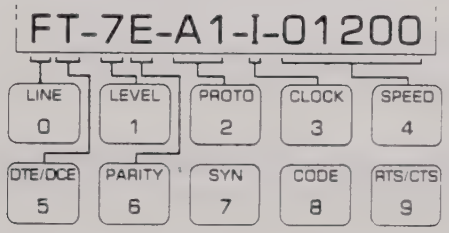
Step 1: Connect the Datatest II Plus to the DTE connector of the TDM.

Step 2: Put the TDM in local channel digital loopback.

Step 3: Press the ON/OFF key on the Datatest II Plus.

Step 4: After the selftest, select the BERT mode.

Step 5: Use the light blue (0-9 keys to match the test set to the operating characteristics of the TDM. The lower display line summarizes this information as shown. The possible parameter selections are as shown below.



Step 6: Use the cursor keys to select the message and number of received blocks per test.

Step 7: Press the RUN key.

If this test is successful put the TDM in high speed local digital loopback. If this mode is not available, then set the TDM for normal operation, and put the modem in analog loopback. Further ex-

tensions to the test include trying different test messages to ensure that data sensitivity is not a problem, and testing each input channel.

Successful Test Indications

If the tests were successful, the sync indicator will be illuminated, and no errors should be counted. The error detection circuitry can be checked by pressing the Error Insert key, which will inject one error per block into the data stream.

Unsuccessful Test Indications

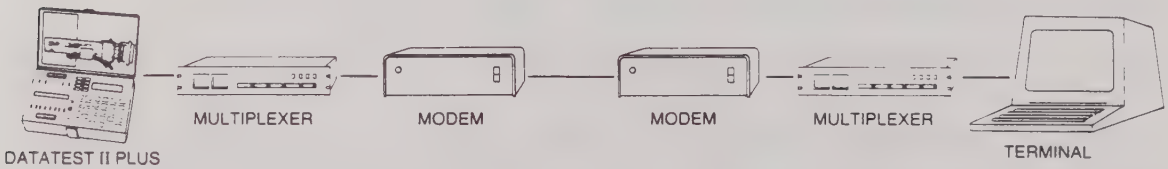
If the sync indicator did not illuminate, or if a high number of errors were detected, the test was unsuccessful. Review the procedure, and check the cable connections. Try the test again

If the test still fails, try it on a different input channel, to see if the problem is isolated. Peripheral equipment may be tested using other procedures outlined in this section

STATISTICAL MULTIPLEXER TESTING

Application: To verify the proper operation of a statistical multiplexer Since loopback test techniques have previously been discussed, this example will detail a system test

Set up: Connect the Datatest II Plus as shown.



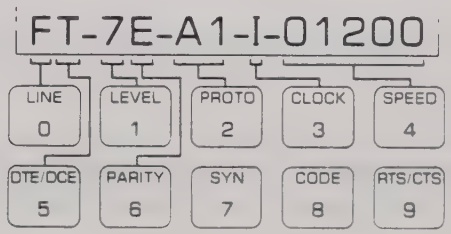
Procedure:

Step 1: Connect the Datatest II Plus to an input channel (DTE) of the multiplexer

Step 2: Press the ON/OFF key on the Datatest II Plus.

Step 3: Press the BERT key.

Step 4: Use the light blue (0-9) keys to match the test set to the operating characteristics of the circuit. The lower display line summarizes this information as shown.



Step 5: Use the cursor keys to select the FOX message. and CONT block transmission. The 7 or 8 level FOX message is controllable by XON/XOFF in full duplex.

Step 6: Press the RUN key.

Successful Test Indications

To test the basic transmission capabilities of the multiplexer ensure that the remote end is receiving the message correctly. To test the traffic control capability, have the remote terminal transmit an XOFF character to the test set. This should stop the transmission, but leave the interface signals active. If an XON character is then sent, the test set should begin transmission where it left off, as can be verified with the terminal.

Alternatively. if the test set if left running long enough, (several minutes), most multiplexers will generate their own XOFF. This should be followed closedly with an XON character, to resume transmission.

Unsuccessful Test Indications

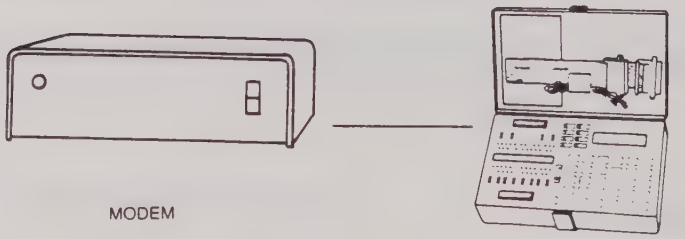
If the test was unsuccessful, the remote end will not have received the data properly, or the test set will not receive an XOFF character. In the former case, review the test procedure and check the cable connections. Try the test again. If it still fails, perform loopback tests as already described on each component until the defective component is isolated.

If data is received properly, but XOFF is not received by the Datatest II Plus, check the overflow indicator on the multiplexer to ensure that the multiplexer buffer has not overflown. If this is the case, run the test at a lower date rate to determine if the problem is a traffic control one. Test all input channels.

DATA EDGE TRANSITION DETECTION

Application: To detect the occurance of data edge transitions, either positive or negative, that occur on any two interface conductors.

Set up: The Datatest II Plus may be set up to detect a glitch while monitoring a line, or while simulating a DTE or DCE. The illustration below depicts Datatest II Plus as a DTE.



MODEM

DATATEST II PLUS

Procedure:

Step 1: Connect the Datatest II Plus (DCE connector) to the modem.

Step 2: Press the ON/OFF key.

Step 3: Assuming that a conductor is to be monitored for a a transition while a Bert test is being performed, press the BERT key and set up the tester as explained previously

Step 4: Press the TIMER key. This secondary task may be performed concurrently with any red key task.

Step 5: Using the down cursor key, select AUTO AUTO.

Step 6: Patch E1 and E2 to the conductors to be monitored.

Step 7: Press the RUN key

The Datatest II Plus will sample the state of both conductors when RUN is pressed, and detect which one changes state first, and in what direction. When either conductor changes state again, this information is stored. The time delay between these 2 events is also measured, and all information is shown in the TIMER result menu, which can be seen by pressing the down cursor key. The CLEAR key will reset the timer operation.

Successful Test Indications

The timer result menu will indicate at least one change of state (assuming one occurred).

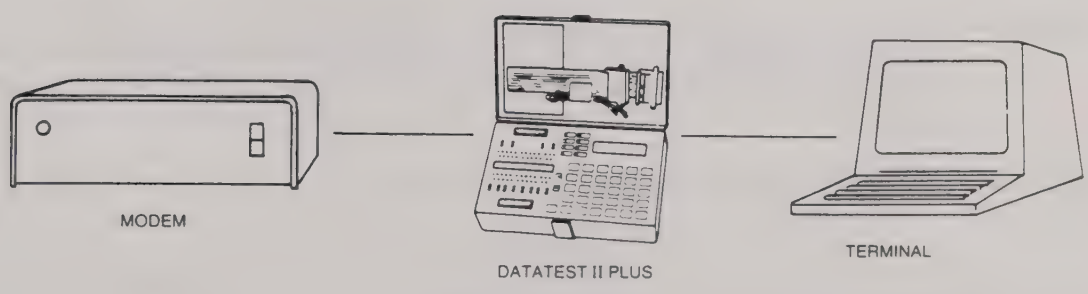
Unsuccessful Test Indications

To verify that the test is working, disconnect a jumper from its connection on the breakout box and touch the end of it lightly against the + V pin. If touching an active signal fails to register a count, check the patch cord to ensure it is not open. This can be done by patching + V to the + monitor. The monitor should illuminate.

END TO END NETWORK RESPONSE TIME MEASUREMENT

Application: To measure the delay between the time an inquiry is sent to a remote location, and the return of a response from the remote end. Typically the test is used to determine the delay encountered when accessing a remote computer to retrieve specific information.

Set up: Connect the Datatest II Plus in line as shown.



Procedure:

Step 1: Connect the Datatest II Plus between the terminal and the modem.

Step 2: Press the ON/OFF key

Step 3: After the selftest, press the MON key.

Step 4: Set up the tester to monitor the line as described previously.

Step 5: Press the TIMER key.

Step 6: Using the cursor keys, select E1S E2S.

Step 7: Patch E1 to Transmit Data (pin 2), and E2 to Receive Data (pin 3) on the breakout

Step 8: Press the RUN key.

Step 9: Type an inquiry into the terminal and press the Enter or Return Key.

The first spacing bit in the transmit data from the terminal will trigger the timer in the Datatest II Plus to start counting. When the remote end responds, the received data will stop the timer. The total time delay for the inquiry and response will then have been measured.

Successful Test Indications

An inquiry produces a response, and the time delay is shown on the timer display.

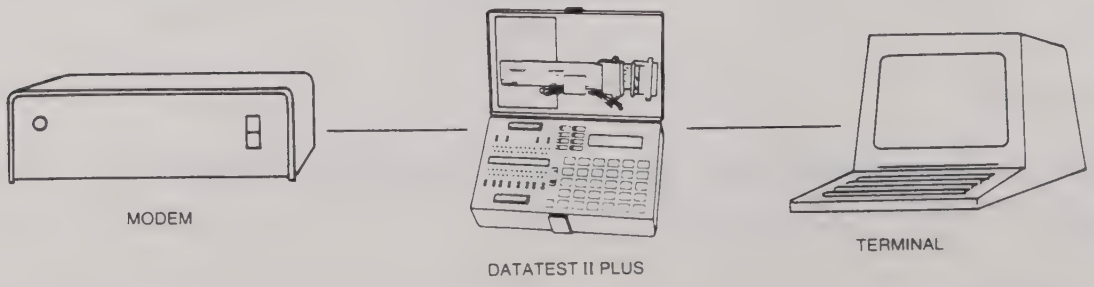
Unsuccessful Test Indications

If the response does not return from the remote end, take the Datatest II Plus out of the circuit and try again. If it still fails to operate, use the test procedures already discussed in this section. If it now operates properly, insert the Datatest II Plus again and review the procedure outlined above. Try the test again. If the test gives a reading which may be too short, i.e. under 5 milliseconds, ensure that the terminal is not in an echo or local copy mode.

FAULT ISOLATION ON ACTIVE CIRCUITS - DTE OR DCE

Application: This test is intended to determine, in the event of a system failure, whether the DTE or the DCE dropped the line first. Once the direction of the circuit trouble has been established, then appropriate diagnostics may be performed on the faulty component.

Set up: Connect the Datatest II Plus in line as shown.



Procedure:

Step 1: Connect the Datatest II Plus in the line on the circuit.

Step 2: Press the ON/OFF key.

Step 3: After verifying that the system is working properly, put the tester in the MON mode, and set it up as previously described.

Step 4: Press the TIMER key.

Step 5: Use the cursor keys to select an AUTO AUTO configuration.

Step 6: Patch E1 to DTR and E2 to DSR on the breakout box.

Step 7: Press the RUN key.

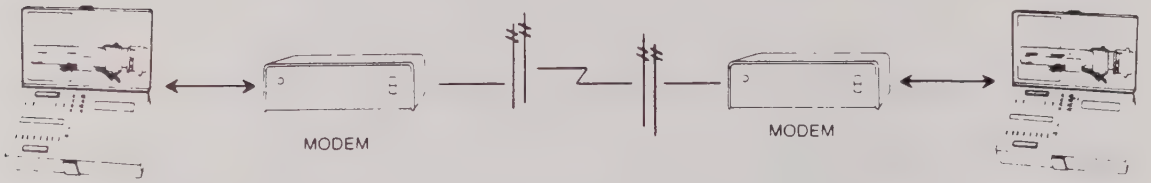
Leave the Datatest II Plus on the circuit until the circuit fails. When this occurs, either the terminal end (if defective) will drop DTR first, or the modem end (if defective) will drop DSR. The tester will indicate which of the two leads fell first, and how much time elapsed before the other lead dropped.

Due to the structure of the multitasking operating system of the Datatest II Plus, the monitor, timer, alarm, and data trap can all run simultaneously. Hence, for this test, the alarm could be set to sound when a sync loss occurs, and the trap programmed to trap the transmit and receive data on the line when the circuit fails. In this way, the user could be notified that a failure occurred by the alarm, determine which end dropped first, and also observe the data traffic on the interface when the problem occurred.

Remote transfer of set ups

Application: To use modem link to transfer all the setups and memory contents of one Datatest II Plus I O to another at a remote location This application is intended to allow central site personnel to assist a field engineer at a remote location

Set up: Connect each Datatest II Plus I O to the modem as shown

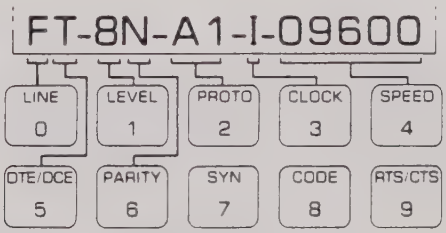


Procedure:

Step 1: Set up the local unit in the manner in which you desire the remote unit, including all blue key setups for all modes, trap, alarm, timer stats, and all user messages

Step 2: On the sending unit, press **XMIT** twice to get the **OUTPUT** function. On the receiving unit, press **ECHO** twice to get the **INPUT** function.

Step 3: Determine which kind of modem is being used, and consult table 1 to match the light blue keys of each Datatest II Plus I/O to the parameters of the modem. The table gives values which will work though other combinations are equally effective The illustration below indicates how the blue keys refer to the set up line in the display.



Step 4: On the sending (local) unit, press the down cursor key to select first **SEND**, then **SETUPS**. On the receiving (remote) unit, press the down cursor key to select **RECEIVE**.

Step 5: Connect both test sets to their respective modems.

Step 6: Press **RUN** on the receiving unit **first,** then press **RUN** on the sending unit. Consult table 1 to determine approximately how long the transfer will take.

Datatest II Plus I.O	Modem Class						
	103/113	202	212	V22.bis	201C	208	209
LINE	full	half	full	full	full	full	full
LEVEL	7	7	7	7	7	7	7
PROTO	async 1 stop	async 1 stop	async 1 stop	async 1 stop	async 1 stop	async 1 stop	async 1 stop
CLOCK	int	int	int	int	ext	ext	ext
SPEED	300	1200	1200	2400	2400	4800	9600
DTE.DCE	DTE	DTE	DTE	DTE	DTE	DTE	DTE
PARITY	none	none	even	none	none	none	none
SYN	any	any	any	any	any	any	any
CODE	ascii	ascii	ascii	ascii	ascii	ascii	ascii
RTS/CTS	any	any	any	any	any	any	any
Time required to complete transer or set ups (min:sec)	3:00	0:45	0:45	0:23	0:23	0:12	0:06
Time required to complete transfer of set ups & results (min:sec)	13:20	3:20	3:20	1:40	1:40	0:50	0:25

Table 1

Successful Indications

The SYNC LED will be on when the unit is receiving data. If the transfer was completed error-free, the receiving unit will eventually display "TEST COMPLETED". The operator may then press the various mode keys and check user messages to assure himself that the new setups are resident.

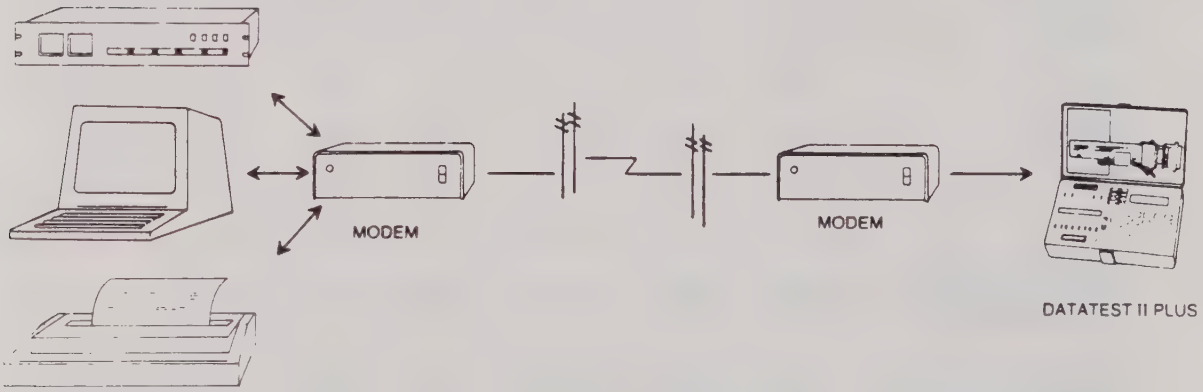
Unsuccessful Indications

If the transfer was not completed, or completed with errors, the receiving unit will detect this condition and abort the test. (The receiver performs error detection every record, approximately every 40 bytes). If the error occurs while transferring results data, the message "INPUT DATA ERR" will be displayed. If the error occurs while transferring set up data, the unit will do a master reset and display "INPUT FATAL ERR" If either of these error messages appear check the blue key line parameters of both testers for compatibility This can be done by trying a quick BERT test on the line If the BERT is successful then the line is OK and the remote transfer should be re-attempted using the same line parameters as those that worked in the BERT test

Remote transfer of results and set ups

Applicaton: Assume a field engineer has performed a test with a Datatest II Plus I O and generated results. This procedure will show how these results may be sent to a CRT or CRT based tester at a central site.

Set up: Connect the remote Datatest II Plus I/O and the central site DTE to the modems as shown

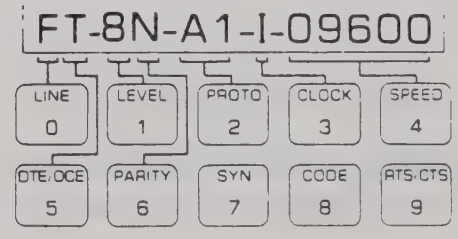


Procedure:

Step 1: Verify that the remote unit contains the test results to be transferred. This may be done by pressing **HALT** and checking the results displayed.

Step 2: In the remote Datatest II Plus I/O, press **XMIT** twice to select the **OUTPUT** function. Set up the central site DTE to be compatible with the remote Navtel unit.

Step 3: Determine which kind of modem is being used, and consult table 1 on page 3 to match the light blue keys of each of the Datatest II Plus I/O parameters to the modem. The table gives values which will work, though other combinations are equally effective. The settings of the light blue keys are summarized in the display as shown below.



Step 4: On the remote unit, press down cursor, selecting first **PRINT**, then **SETUPS** or **RESULTS**.

Step 5: Connect both test sets to their respective modems.

Step 6: Turn on the central site equipment so that it is ready to receive.

Step 7: Press **RUN**.

The central site DTE should be receiving and displaying a formatted list of all test set ups, user messages, and results from the remote Datatest II Plus I/O. The results will not be lost from the sending unit after the transmission. They will remain in protected RAM until erased by running another standard test.

Permanent test set up storage

Application: To store the setups of commonly-used tests so that when the test is needed at a later date it will not have to be rewritten. The information stored will include the individual combinations of blue key settings for all modes, all user messages, and the status of the trap and alarm. All setups will be stored.

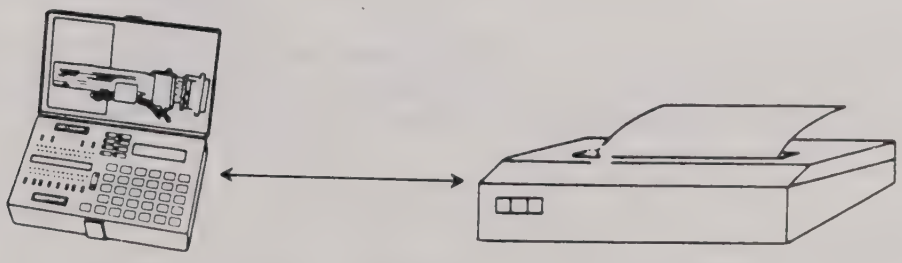
Procedure: There are 3 main ways to store programmed set ups:

Method 1: Printout a hard copy of all set ups on any serial printer.
Method 2: Store all set ups by loading them into a (RAM) Program Pack or storing the capture buffer into a DATA (RAM) Pack.
Method 3: Store all set ups by loading them onto a data recorder or computer database for later retreival.

Each method will be illustrated.

Method 1:

Set up: Connect the Datatest II Plus I/O to the printer as shown.



DATATEST II PRINTER

Step 1: Ensure that all set ups in the Datatest II Plus I/O, including all user messages, are as you wish them to be stored. If there is room, you may wish to use the first or last user message as a label for the set ups, e.g. "A3 SYSTEM TESTS".

Step 2: Connect the DTE connector of the Datatest II Plus I/O to the printer via any standard RS-232C cable.

Step 3: Select the **OUTPUT** function by pressing **XMIT** twice

Step 4: Press the down cursor key, select **PRINT**, and **SETUPS**.

Step 5: Use the light blue cursor keys to match the test set to the printer characteristics Normal settings are given below

LINE:	Full	**DTE/DCE:**	DCE
LEVEL:	7 (sometimes 8)	**PARITY:**	Even, none, (others)
PROTO:	Async, 1 stop bit	**SYN:**	not needed
CLOCK:	Internal	**CODE:**	ASCII
SPEED:	300, 1200, others	**RTS/CTS:**	not needed

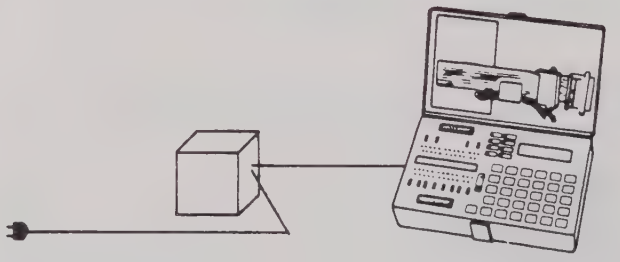
Step 6: Press **RUN**.

The set ups should now be printing. Note that Input Output software versions 1.7 and up will allow flow control both on EIA leads and using XON/XOFF. The tester will check the flow control parameters of the **XMIT** mode and use them when outputting. Of course, all set ups are still resident in the test set after they have been printed, and may only be erased by a deliberate action.

Method 2: Storing set ups or data in a RAM pack.

Application: This method stores all set ups and/or data into a Navtel RAM pack for later retrieval. RAM packs are internally battery backed up for at least 3 years

Set up: Connect the Datatest II Plus I/O as shown.



DATATEST II

Procedure:

Step 1: If the battery low indication has appeared recently, apply AC power to the Datatest II Plus I/O. NOTE: **If this test is attempted on battery power only, and batteries are not sufficiently charged, all memories may be lost.**

Step 2: Ensure that all set ups in the Datatest II Plus I/O, including all user messages, are as you wish them to be stored. If there is room, you may wish to use the first or last user message as a label for the set ups, e.g. "A3 SYSTEM TESTS".

Step 3. Plug the RAM pack into either the DTE or DCE connectors. **Ensure that all breakout switches are in the normally closed position.**

Step 4: Place a jumper from TV to EL to enable the write command.

Step 5: Select the **OUTPUT** function by pressing the **XMIT** key twice

Step 6: Press the down cursor key, and select **PROG.**

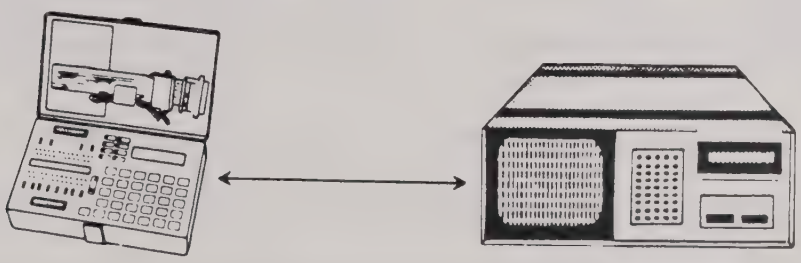
Step 7: Press **RUN.**

Within 4 seconds, the display should change back from **RUNNING** back to a normal mode. You may wish to label the RAM pack appropriately. The RAM pack may be overwritten at a future date if you improve your test or the need to store it disappears.

Method 3: Storing set ups on a tape

Application: Set ups and/or results may be stored into a data recorder or onto a computer database, where they may be later retrieved and down loaded back to another Datatest II Plus I/O. Either a properly set up computer, or a data line monitor type device may be used.

Set up: Connect the Datatest II Plus I/O to the data recorder as shown



DATATEST II

Step 1: Ensure that all set ups in the Datatest II Plus I/O, including all user messages, are as you wish them to be stored. If there is room, you may wish them to be stored. If there is room, you may wish to use the first or last user message as a label for the set ups. e.g. "A3 SYSTEM TESTS"

Step 2: Press the **XMIT** key twice to select the **OUTPUT** function

Step 3: Press the down cursor key to select **SEND**, and then either **SETUPS** or **ALL** if results are also to be stored

Step 4: Use the light blue cursor keys to match the communications set up of the recorder or computer NOTE: **This format must also be used for later retrieval, so attempt to use 'standard' set ups.** The playback speeds may differ from the recording speeds so long as they match between devices

Step 5: Prepare the data recorder with a blank tape, or at a section preceded by a blank section, and start the recorder. In the case of a computer, prepare it to receive the data into a file and start the computer

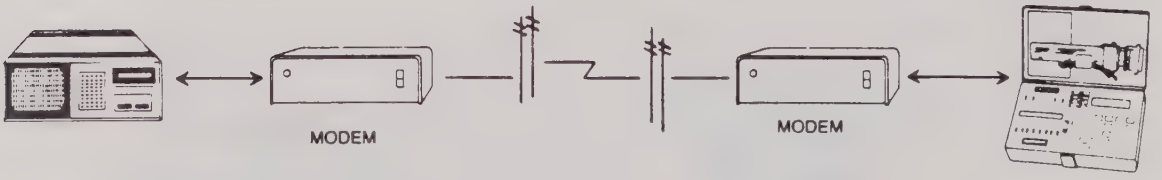
Step 6: Press **RUN** on the Datatest II Plus I/O

The tape or computer file now contains all the information necessary to completely reconfigure a Datatest II Plus I/O. The following application in this document will illustrate the retrieval process

Retrieving set ups from a database

Application: This application describes how to load a combination of set ups into a Datatest II Plus I/O from a database or data recorder. The data may be downloaded locally or remotely. This application assumes the case where a remote field engineer has requested set ups to be sent from the central site.

Set up: Connect the Datatest II Plus I/O to the network as shown



Procedure:

Step 1: Press the **ECHO** key twice on the Datatest II Plus I/O to select the **INPUT** mode

Step 2: Press the down cursor key to select **RECEIVE.**

Step 3: Set up the blue key parameters to be compatible with both the modem network and the remote DTE. Note that the data format selected must agree with the method used when the set ups were stored. See table 1 on page 3.

Step 4: Connect both DTE to their modems.

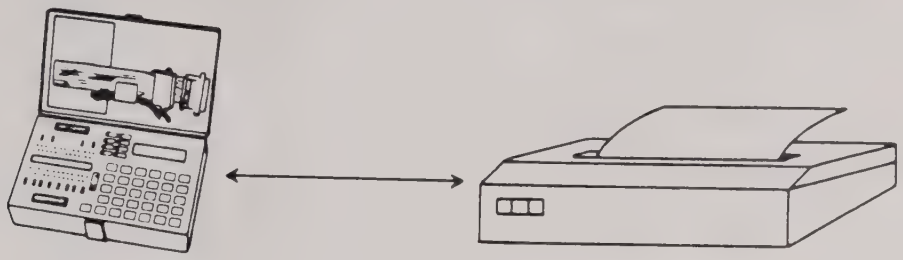
Step 5: Press **RUN** on the Datatest II Plus I/O first, **then** start transmitting from the database. Consult table 1 to determine how long the transferral should take.

When the transmission is completed, the display should change from **RUNNING** to a standard mode. The receiver will abort the test automatically if an error is detected in the received transmission. In this event the operator should re-try the test after double checking the set up.

Obtaining a printout of test results.

Application: This procedure explains how to obtain a printout of all test results, including the data buffer. This listing could be used for benchmark purposes, an installation test record, or for later convenient data review

Set up: Connect the Datatest II Plus I/O to the printer as shown.



DATATEST II PRINTER

Procedure: This procedure is identical to "**Permanent test set up storage, Method 1**", except for steps 1 and 4, which are as follows:

Step 1: Ensure that the Datatest II Plus I/O contains the results to be recorded. This can be done by pressing **HALT**, and using the cursor keys.

Step 4: Press the down cursor key, and select first **PRINT**, and then **RESULTS**.

The Datatest II will obey EIA flow control as well as the XON/XOFF flow control as defined in the XMIT mode.

For additional copies of this applications section, or other applications information, contact your local Navtel representative.

SECTION 6 - Appendices

Appendix 1: Datatest II Plus symbol table

Sy	Mnc	Definition	Sy	Mnc	Definition
	NUL	All zeroes		DC1	Device control 1
	SOH	Start of header		DC2	Device control 2
	STX	Start of text		DC3	Device control 3
	ETX	End of text		DC4	Device control 4
	EOT	End of transmission		NAK	Negative acknowledgement
	ENQ	Enquiry		SYN	Synchronous idle
	ACK	Acknowledgement		ETB	End of transmitted block
	BEL	Bell		CAN	Cancel
	BS	Backspace		EM	End of medium
	HT	Horizontal tabulation		SUB	Start of special sequence
	LF	Line feed		ESC	Escape
	VT	Vertical tabulation		FS	Information file separator
	FF	Form feed		GS	Information group separator
	CR	Carriage return		RS	Information record separator
	SO	Shift out		US	Information unit separator
	SI	Shift in		DEL	Delete
	DLE	Data link escape			

Note:

= Valid control code, not individually differentiated.
(BS, HT, SO, SI, DC2, DC4, ETB, CAN, EM, SUB, FS, GS, RS, US, DEL)
To identify, check hex representation.

= Invalid control code

= Time fill character

= local address field character for poll message
(displayed in USER mode only) (8F hex)

= user message "don't care" character
(displayed in USER mode only) (80 hex)

= end of frame indicator (BOP)

Appendix 2: Code conversion charts

Hex Input	ASCII	EBCDIC	BAUDOT Letters	BAUDOT Figures	EBCD LC	EBCD UC	Hex Input
00	NUL	NUL	E	3	(SP)	(SP)	00
01	SOH	SOH	LF	LF	–	–	00
02	STX	STX	A	–			02
03	ETX	ETX	(SP)		&	–	03
04	EOT	PF	S		8	*	04
05	ENQ	HT	I	8	q	Q	05
06	ACK	LC	U	7	y	Y	06
07	BEL	DEL	CR	CR	h	H	07
08	BS		D	$	4		08
09	HT	RFL	R	4	m	M	09
0A	LF	SMM	J	'	u	U	0A
0B	VT	VT	N	,	d	D	0B
0C	FF	FF	F	!	D2	D2	0C
0D	CR	CR	C	:			0E
0E	SO	SO	K	(			0E
0F	SI	SI	T	5	D4	D4	0F
10	DLE	DLE	Z		2		10
11	DC1	DC1	L	)	k	K	11
12	DC2	DC2	W	2	s	S	12
13	DC3	DC3	H	#	b	B	13
14	DC4	RES	Y	6	0	)	14
15	NAK	NL	P	0	#	#	15
16	SYN	BS	Q	1	.		16
17	ETB	IL	O	9			17
18	CAN	CAN	B	?	6	.	18
19	EM	EM	G	&	o	O	19
1A	SUB	CC	Λ (UC)	Λ (UC)	w	W	1A
1B	ESC		M	.	f	F	1B
1C	FS	IFS	X	/	Λ	Λ (UC)	1C
1D	GS	IGS	V	;	BS	BS	1D
1E	RS	IRS					1E
1F	US	IUS	V (LC)	V (LC)	V	V (LC)	1F
20	SP	DS			1	=	20
21	!	SOS			]	J	21
22	"	FS				?	22
23	#				a	A	23
24	$	BYP			9	(	24
25	%	LF			r	R	25
26	&	ETB			z	Z	26
27	'	ESC			i	I	27
28	(				5	%	28
29	)				n	N	29
2A	*	SM			v	V	2A
2B	+				e	E	2B
2C	,				RS	RS	2C
2D	–	ENQ			CR	CR	2D
2E	.	ACK			LF	LF	2E
2F		BEL			HT	HT	2F

Hex Input	ASCII	EBCDIC	EBCD LC	EBCD UC	Hex Input
30	0		3		30
31	1		1	L	31
32	2	SYN (⎍)	t	T	32
33	3		c	C	33
34	4	PN	#	·	34
35	5	RS (◘)	$	·	35
36	6	UC		1	36
37	7	EOT (⬊)		Λ	37
38	8		7	>	38
39	9		p	P	39
3A	·		x	X	3A
3B	·		g	G	3B
3C		DC4 (◘)	ET	ET	3C
3D	=	NAK (⁘)	SY	SY	3D
3E			SH	SH	3E
3F	?	SUB (◘)	(PAD)	(PAD)	3F
40	@	SP	SP	SP	40
41	A		–	–	41
42	B		@	¢	42
43	C		&	–	43
44	D		8	·	44
45	E		q	Q	45
46	F		y	Y	46
47	G		h	H	47
48	H		4		48
49	I		m	M	49
4A	J	¢	u	U	4A
4B	K	.	d	D	4B
4C	L	<	D2	D2	4C
4D	M	(			4D
4E	N	+			4E
4F	O	[	D4	D4	4F
50	P	&	2		50
51	Q		k	K	51
52	R		s	S	52
53	S		b	B	53
54	T		0	)	54
55	U		#	#	55
56	V		.	.	56
57	W				57
58	X		6	·	58
59	Y		o	O	69
5A	Z	!	w	W	5A
5B	[	$	f	F	5B
5C		*	Λ	Λ (UC)	5C
5D	]	)	BS	BS	5D
5E		;			5E
5F	–	]	V	V (LC)	5F
60		–	1	=	60
61	a	/	j	J	61

Hex Input	ASCII	EBCDIC	EBCD LC	EBCD UC	Hex Input
62	b		Λ	?	62
63	c		a	A	63
64	d		9	I	64
65	e		r	R	65
66	f		z	Z	66
67	g		;		67
68	h		5	%	68
69	i		n	N	69
6A	j		v	V	6A
6B	k		e	E	6B
6C	l	%	RS	RS	6C
6D	m	-	CR	CR	6D
6E	n		LF	LF	6E
6F	o	?	HT	HT	6F
70	p		3		70
71	q		1	L	71
72	r		t	T	72
73	s		c	C	73
74	t		#		74
75	u		$	'	75
76	v		.	I	76
77	w			Λ	77
78	x		7	>	78
79	y		p	P	79
7A	z		x	X	7A
7B		#	g	G	7B
7C		@	ET	ET	7C
7D		-	SY	SY	7D
7E		=	SH	SH	7E
7F	DEL (⌫)	"	(PAD)	(PAD)	7F
80					80
81		a			81
82		b			82
83		c			83
84		d			84
85		e			85
86		f			86
87		g			87
88		h			88
89		i			89
8A					8A
8B					8B
8C					8C
8D					8D
8E					8E
8F					8F
90					90
91		j			91
92		k			92
93					93

Hex Input	EBCDIC	Hex Input
94	m	94
95	n	95
96	o	96
97	p	97
98	q	98
99	r	99
9A		9A
9B		9B
9C		9C
9D		9D
9E		9E
9F		9F
A0		A0
A1		A1
A2	s	A2
A3	t	A3
A4	u	A4
A5	v	A5
A6	w	A6
A7	x	A7
A8	y	A8
A9	z	A9
AA		AA
AB		AB
AC		AC
AD		AD
AE		AE
AF		AF
B0		B0
B1		B1
B2		B2
B3		B3
B4		B4
B5		B5
B6		B6
B7		B7
B8		B8
B9		B9
BA		BA
BB		BB
BC		BC
BD		BD
BE		BF
BF		BE
C0		C0
C1	A	C1
C2	B	C2
C3	C	C3
C4	D	C4
C5	E	C5
C6	F	C6
C7	G	C7

Hex Input	EBCDIC	Hex Input
C8	H	C8
C9	I	C9
CA		CA
CB		CB
CC		CC
CD		CD
CE		CE
CF		CF
D0		D0
D1	J	D1
D2	K	D2
D3	L	D3
D4	M	D4
D5	N	D5
D6	O	D6
D7	P	D7
D8	Q	D8
D9	R	D9
DA		DA
DB		DB
DC		DC
DD		DD
DE		DE
DF		DF
E0		E0
E1		E1
E2	S	E2
E3	T	E3
E4	U	E4
E5	V	E5
E6	W	E6
E7	X	E7
E8	Y	E8
E9	Z	E9
EA		EA
EB		EB
EC		EC
ED		ED
EE		EE
EF		EF
F0		F0
F1	1	F1
F2	2	F2
F3	3	F3
F4	4	F4
F5	5	F5
F6	6	F6
F7	7	F7
F8	8	F8

Hex Input	EBCDIC	Hex Input
F9	9	F9
FA		FA
FB		FB
FC		FC
FD		FD
FE		FE
FF		FF

Note: ◘ = Valid control code, not individually differentiated.
(PF, LC, SMM, RLF, SO, SI, DC2, DC4, RES, NL, BS, IL, CAN, EM, CC, IFS, IGS, IRS, IUS, SOS, FS, BYP, ETB, SM, PN, RS, UC, SUB)
To identify, check hex representation.

☒ = Invalid control code

❖ = Time fill character

Appendix 3: User defined code translation tables

IPARS

To display this character:	x̃	.	(	x̃	G	X	P	7	.	#	<	*	C	T	L	3
For this hex input:	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Key in this hex pair:	F8	2C	28	F8	47	58	50	37	2E	23	3C	2A	43	54	4C	33

To display this character:	x̃	x̃	x̃	x̃	E	V	N	5	I	Z	R	9	A	x̃	J	1
For this hex input:	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Key in this hex pair:	F8	F8	F8	F8	45	56	4E	35	49	5A	52	39	41	F8	4A	31

To display this character:	"	[	)	=	F	W	O	6	?	-	:	Ø	B	S	K	2
For this hex input:	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
Key in this hex pair:	22	5B	29	3D	46	57	4F	36	3F	2D	3A	30	42	53	4B	32

To display this character:	%	SP	+	←	D	U	M	4	H	Y	Q	8	$	x̃	@	x̃
For this hex input:	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
Key in this hex pair:	25	20	2B	7F	44	55	4D	34	48	59	51	38	24	F8	40	F8

SYNC = (00_{16}) . (20_{16})

XS-3

To display this character:	SP	]	-	0	1	2	3	4	5	6	7	8	9	\	;	[
For this hex input:	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Key in this hex pair:	20	5D	2D	30	31	32	33	34	35	36	37	38	39	A4	3B	5B

To display this character:	+	:	.	?	A	B	C	D	E	F	G	H	I	=	<	#
For this hex input:	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Key in this hex pair:	2B	3A	2E	3F	41	42	43	44	45	46	47	48	49	3D	3C	23

To display this character:	@	*	$	!	J	K	L	M	N	O	P	Q	R	%	'	^
For this hex input:	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
Key in this hex pair:	40	2A	24	21	4A	4B	4C	4D	4E	4F	50	51	52	25	27	5E

To display this character:	–	(	,	&	/	S^1	T	U	V	W	X	Y	Z	)	>	
For this hex input:	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
Key in this hex pair:	5F	28	2C	26	2F	53	54	55	56	57	58	59	5A	29	3E	22

To display this character:	SP	]	—	Ø	1	2	3	4	5	6	7	8	9	\	;	[
For this hex input:	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
Key in this hex pair:	20	5D	2D	30	31	32	33	34	35	36	37	38	39	A4	3B	5B

To display this character:	+	:	.	?	A	B^2	C	D	E	F	G	H	I	=	<	#
For this hex input:	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
Key in this hex pair:	2B	3A	2E	3F	41	42	43	44	45	46	47	48	49	3D	3C	23

To display this character:	@	*	$		↓	K	L	M	N	O	P	Q	R	%		^
For this hex input:	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
Key in this hex pair:	40	2A	24	21	4A	4B	4C	4D	4E	4F	50	51	52	25	27	5E

To display this character:	—	(	.	&	↑	S	T	U	V	W	X	Y	Z	)	>	"
For this hex input:	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
Key in this hex pair:	5F	28	2C	26	2F	53	54	55	56	57	58	59	5A	29	3E	22

[1]SYNC = even parity S(35_{16})

[2]EOM = even parity B(55_{16})

Selectric (Upper case)

To display this character:	SP	–	T	J	$	O	L	?	%	"	E	P	x̃	x̃	x̃	x̃
For this hex input:	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Key in this hex pair:	20	2D	54	4A	24	4F	4C	3F	25	22	45	50	F8	F8	F8	F8

To display this character:	@	.	N	+	Z	x̃	x̃	x̃	x̃	I	K	Q	^	BS	EB	\
For this hex input:	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Key in this hex pair:	40	3A	4E	2B	5A	F8	F8	F8	F8	49	4B	51	5E	A1	A1	A4

To display this character:	[	M	X	G	)	S	H	Y	&	R	D	:	RS	CR	LF	HT
For this hex input:	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
Key in this hex pair:	28	4D	58	47	29	53	48	59	26	52	44	3A	A1	7F	D0	AA

To display this character:	#	V	U	F	(	W	B	–	*	A	C	,	ET	x̃	x̃	PAD
For this hex input:	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
Key in this hex pair:	23	56	55	46	28	57	42	5F	2A	41	43	2C	00	F8	F8	FF

To display this character:	SP	–	T	J	$	O	L	?	%	"	E	P	x̃	x̃	x̃	x̃
For this hex input:	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
Key in this hex pair:	20	2D	54	4A	24	4F	4C	3F	25	22	45	50	F8	F8	F8	F8

To display this character:	@	.	N	+	Z	x̃	x̃	x̃	x̃	I	K	Q	^	BS	EB	\
For this hex input:	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
Key in this hex pair:	40	3A	4E	2B	5A	F8	F8	F8	F8	49	4B	51	5E	A1	A1	A4

To display this character:	[	M	X	G	)	S	H	Y	&	R	D	:	RS	CR	LF	HT
For this hex input:	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
Key in this hex pair:	28	4D	58	47	29	53	48	59	26	52	44	3A	A1	7F	DO	A1

To display this character:	#	V	U	F	(	W	B	—	*	A	C	,	ET	x̃	x̃	PAD
For this hex input:	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
Key in this hex pair:	23	56	55	46	28	57	42	5F	2A	41	43	2C	00	F8	F8	FF

Selectric (Lower case)

To display this character:	SP	!	t	j	4	o	l	/	5	'	e	p	x̃	x̃	x̃	x̃
For this hex input:	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Key in this hex pair:	20	21	74	6A	34	6F	6C	2F	35	27	65	70	F8	F8	F8	F8

To display this character:	2	.	n	=	z	x̃	x̃	x̃	6	i	k	q	∧	BS	EB	\
For this hex input:	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Key in this hex pair:	32	2E	6E	3D	7A	F8	F8	F8	36	69	6B	71	5E	A1	A1	A4

To display this character:	1	m	x	g	0	s	h	y	7	r	d	;	RS	CR	LF	HT
For this hex input:	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
Key in this hex pair:	31	6D	78	67	30	73	68	79	37	72	64	6A	A1	7F	D0	AA

To display this character:	3	v	u	f	9	w	b	–	8	a	c	,	ET	x̃	x̃	pad
For this hex input:	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
Key in this hex pair:	33	76	75	66	39	77	62	2D	38	61	63	2C	00	F8	F8	FF

To display this character:	SP	!	t	j	4	o	l	/	5	'	e	p	x̃	x̃	x̃	x̃
For this hex input:	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
Key in this hex pair:	20	21	74	6A	34	6F	6C	2F	35	27	65	70	F8	F8	F8	F8

To display this character:	2	.	n	=	z	x̃	x̃	x̃	6	i	k	q	∧	BS	EB	\
For this hex input:	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
Key in this hex pair:	32	2E	6E	3D	7A	F8	F8	F8	36	69	6B	71	5E	A1	A1	A4

To display this character:	1	m	x	g	0	s	h	y	7	r	d	;	RS	CR	LF	HT
For this hex input:	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
Key in this hex pair:	31	6D	78	67	30	73	68	79	37	72	64	6A	A1	7F	DO	AA

To display this character:	3	v	u	f	9	w	b	—	8	a	c	,	ET	x̃	x̃	pad
For this hex input:	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
Key in this hex pair:	33	76	75	66	39	77	62	2D	38	61	63	2C	00	F8	F8	FF

Reverse EBCD (Upper case)

To display this character:	SP	=	<		:	%	.	>	*	(	)	"	]	FF	^	ET
For this hex input:	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Key in this hex pair:	20	3D	3C	3B	3A	25	27	3E	2A	28	29	22	5D	AE	5E	00

To display this character:	x̃	?	S	T	U	V	W	X	Y	Z	x̃	x̃	{	LF	EB	x̃
For this hex input:	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Key in this hex pair:	F8	3F	53	54	55	56	57	58	59	5A	F8	F8	7B	D0	A1	F8

To display this character:	–	J	K	L	M	N	O	P	Q	R	x̃	!	x̃	CR	BS	x̃
For this hex input:	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
Key in this hex pair:	2D	4A	4B	4C	4D	4E	4F	50	51	52	F8	21	F8	7F	A1	F8

To display this character:	+	A	B	C	D	E	F	G	H	I	x̃	x̃	`	HT	\	PAD
For this hex input:	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
Key in this hex pair:	2B	41	42	43	44	45	46	47	48	49	F8	F8	60	AA	A4	FF

To display this character:	SP	=	<	;	:	%	.	>	*	(	)	"	]	FF	^	EF
For this hex input:	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
Key in this hex pair:	20	3D	3C	3B	3A	25	27	3E	2A	28	29	22	5D	AE	5E	00

To display this character:	x̃	?	S	T	U	V	W	X	Y	Z	x̃	x̃	{	F	EB	x̃
For this hex input:	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
Key in this hex pair:	F8	3F	53	54	55	56	57	58	59	5A	F8	F8	7B	D0	A1	F8

To display this character:	–	J	K	L	M	N	O	P	Q	R	x̃	!	x̃	CR	BS	x̃
For this hex input:	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
Key in this hex pair:	2D	4A	4B	4C	4D	4E	4F	50	51	52	F8	21	F8	7F	A1	F8

To display this character:	+	A	B	C	D	E	F	G	H	I	x̃	x̃	\	HT	\	PAD
For this hex input:	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
Key in this hex pair:	2B	41	42	43	44	45	46	47	48	49	F8	F8	60	AA	A4	FF

Reverse EBCD (Lower case)

To display this character:	SP	1	2	3	4	5	6	7	8	9	0	#	[	FF	^	ET
For this hex input:	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Key in this hex pair:	20	31	32	33	34	35	36	37	38	39	30	23	5B	AE	5E	00

To display this character:	@		s	t	u	v	w	x	y	z	x̃	`	}	x̃	x̃	x̃
For this hex input:	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F
Key in this hex pair:	40	2F	73	74	75	76	77	78	79	7A	F8	2C	7D	F8	F8	F8

To display this character:	–	j	k	l	m	n	o	p	q	r	x̃	$	x̃	CR	BS	x̃
For this hex input:	20	21	22	23	24	25	26	27	28	29	2A	2B	2C	2D	2E	2F
Key in this hex pair:	2D	6A	6B	6C	6D	6E	6F	70	71	72	F8	24	F8	7F	A1	F8

To display this character:	&	a	b	c	d	e	f	g	h	i	x̃	.	~	HT	\	PAD
For this hex input:	30	31	32	33	34	35	36	37	38	39	3A	3B	3C	3D	3E	3F
Key in this hex pair:	26	61	62	63	64	65	66	67	68	69	F8	2E	F3	AA	A4	FF

To display this character:	SP	1	2	3	4	5	6	7	8	9	0	#	[	FF	^	ET
For this hex input:	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F
Key in this hex pair:	20	31	32	33	34	35	36	37	38	39	30	23	5B	FF	5E	00

To display this character:	@	/	s	t	u	v	w	x	y	z	x̃	,	?	x̃	x̃	x̃
For this hex input:	50	51	52	53	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F
Key in this hex pair:	40	2F	73	74	75	76	77	78	79	7A	F8	2C	7D	F8	F8	F8

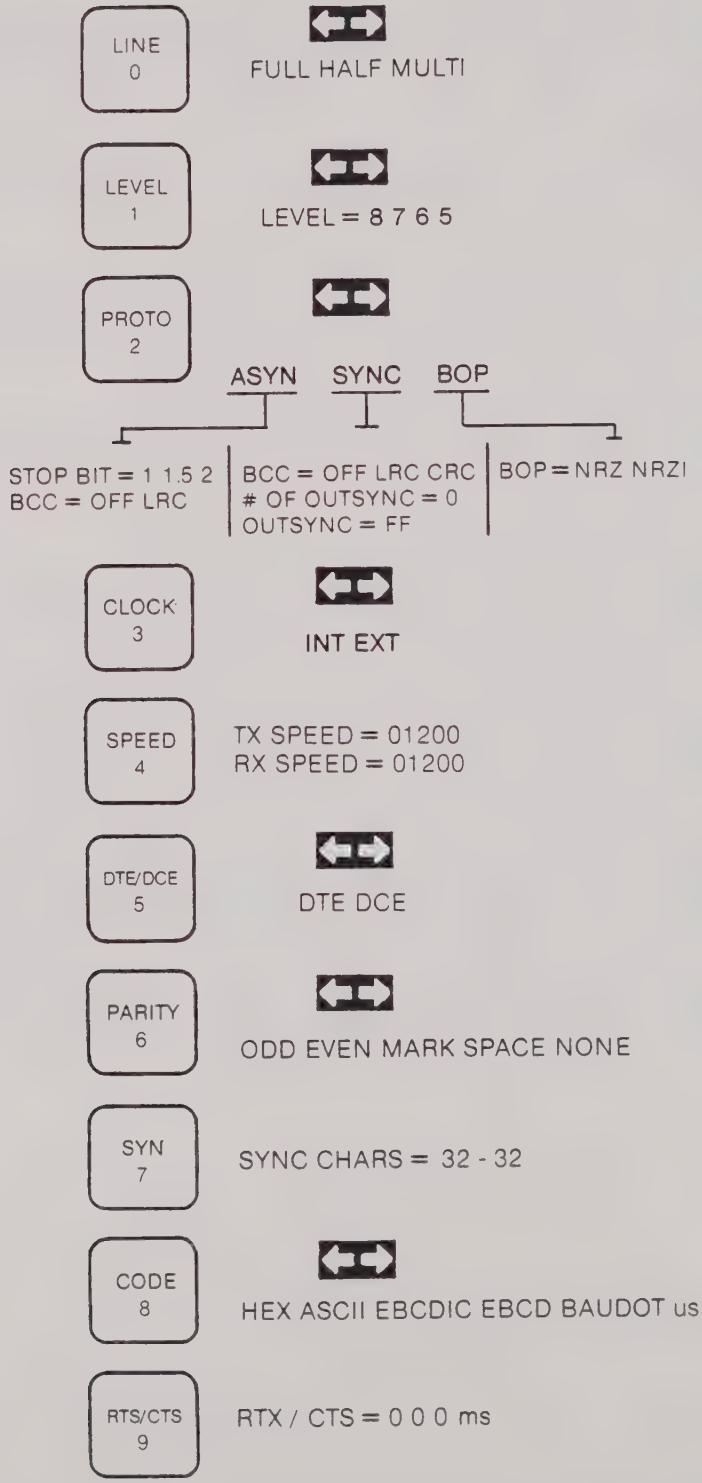
To display this character:	–	j	k	l	m	n	o	p	q	r	x̃	$	x̃	CR	BS	x̃
For this hex input:	60	61	62	63	64	65	66	67	68	69	6A	6B	6C	6D	6E	6F
Key in this hex pair:	2D	6A	6B	6C	6D	6E	6F	70	71	72	F8	24	F8	7F	A1	F8

To display this character:	&	a	b	c	d	e	f	g	h	i	x̃	.	~	HT	\	PAD
For this hex input:	70	71	72	73	74	75	76	77	78	79	7A	7B	7C	7D	7E	7F
Key in this hex pair:	26	61	62	63	64	65	66	67	68	69	F8	2E	F3	AA	A4	FF

Appendix 4: Menu Tables

LINE PARAMETERS

(LIGHT BLUE KEYS)



SECONDARY FUNCTION KEYS

(DARK BLUE KEYS)

TRAP A

TRAP - OFF - ERROR

↕

OFF POS CTR PRE

↕

ERROR E1 M E1 S SYNLOS USER 0

TIMER C

TIMER - AUTO - AUTO
- 0 0 0 0 0 ms -

↕

AUTO E1 M E1 S E2 M E2 S

↕

AUTO E1 M E1 S E2 M E2 S

USER E

USER - 0 - 000
BUF REMAINS = 1023

↓

MESSAGE NUMBER = [0]

↕

ASCII EBCDIC EBCD BAUDOT user 0

↕

KEY TD RD DEFINE

↕

□ - - - - - (ENTER IN HEX)

↕

REPEAT: 0 TIMES

↓

TO THE LAST PRIMARY FUNCTION

ALARM B

ALARM - OFF - ERROR

↕

OFF ON

↕

ERROR E1 M E1 S END SYNLOS

TEST D

MASTER RESET

↕

INTERFACE TEST

↕

SPECIAL TEST

↕

DISPLAY TEST

↕

KEYBOARD TEST

↕

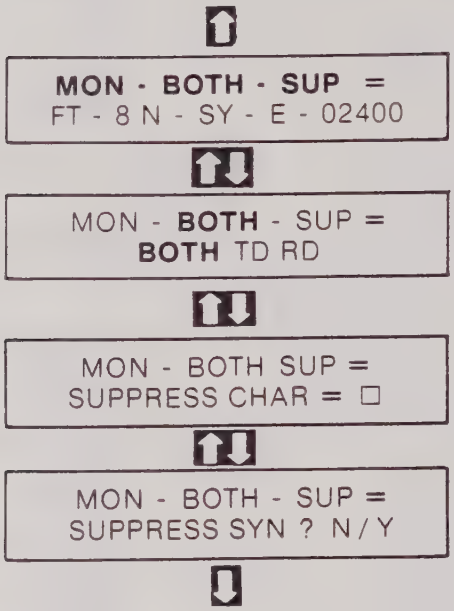
ROM TEST

↕

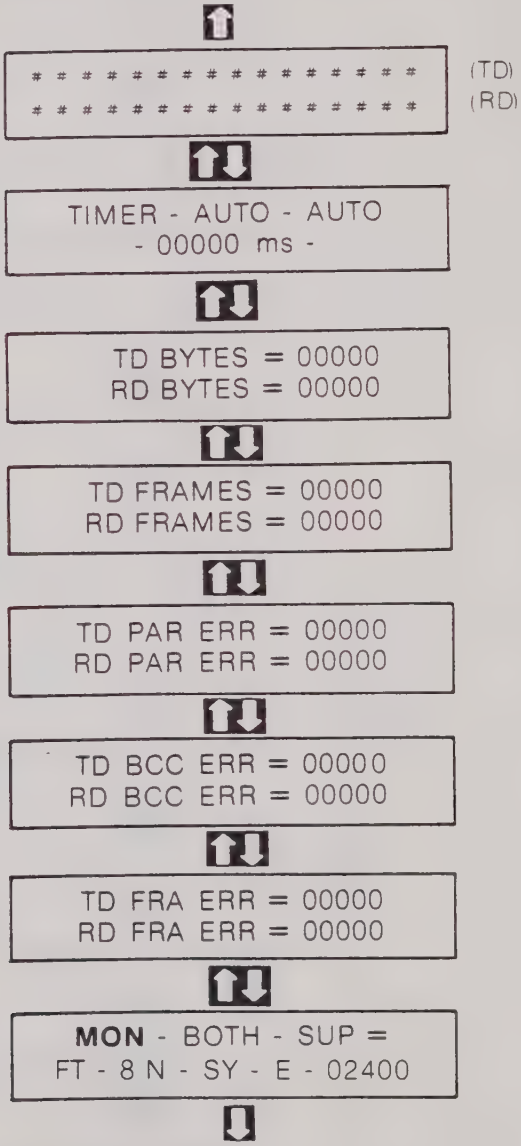
RAM TEST

NOTE: TO ESCAPE SECONDARY FUNCTION. DEPRESS ANY PRIMARY FUNCTION KEY

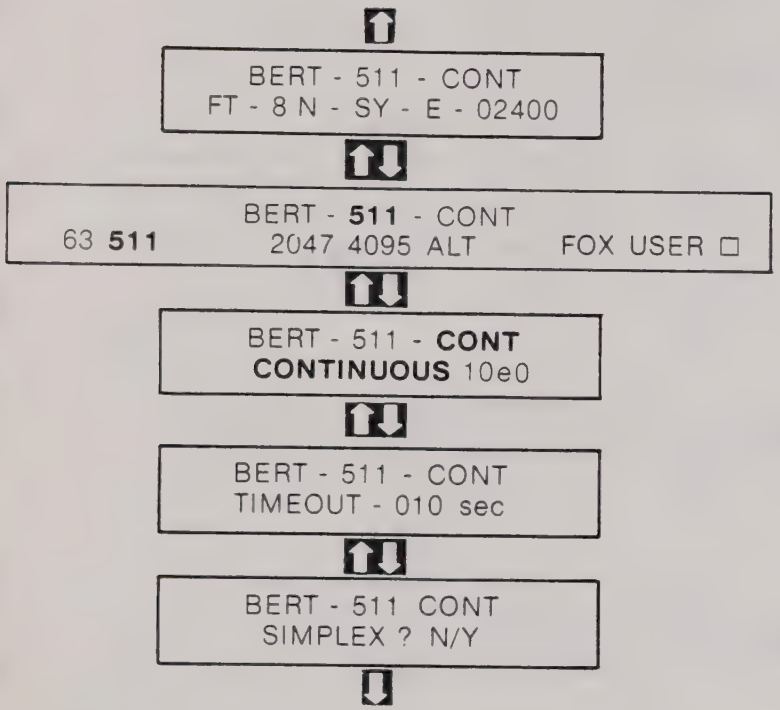
MONITOR SETUP MENU



MONITOR RESULT MENU

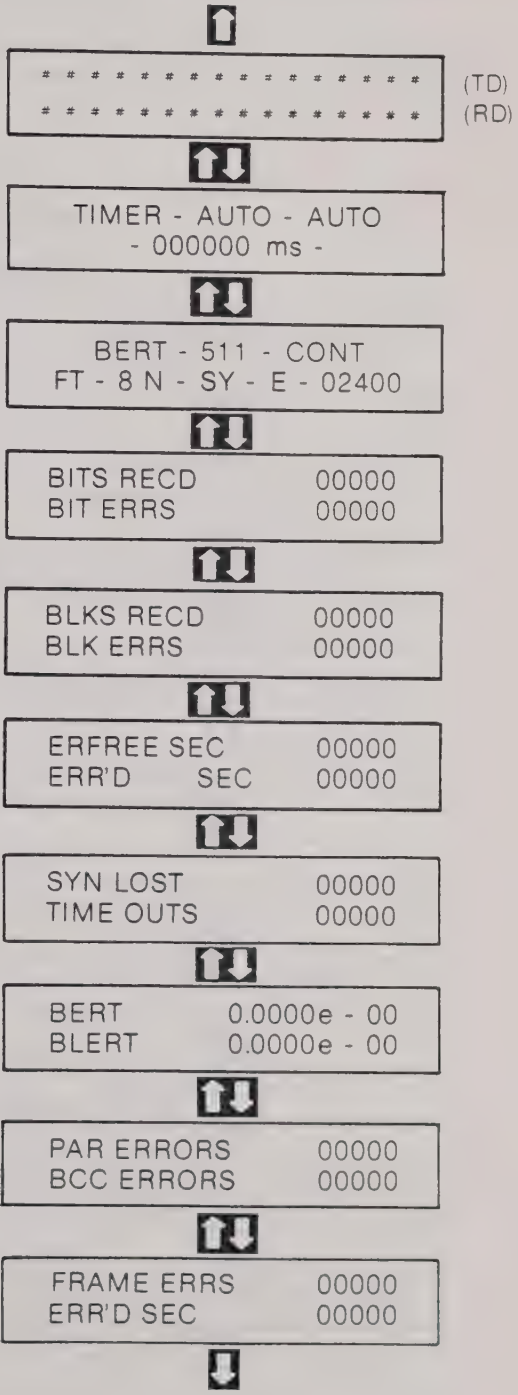

(TD)
(RD)
TIMER - AUTO - AUTO
- 00000 ms -
TD BYTES = 00000
RD BYTES = 00000
TD FRAMES = 00000
RD FRAMES = 00000
TD PAR ERR = 00000
RD PAR ERR = 00000
TD BCC ERR = 00000
RD BCC ERR = 00000
TD FRA ERR = 00000
RD FRA ERR = 00000
MON - BOTH - SUP =
FT - 8 N - SY - E - 02400

BERT SETUP MENU

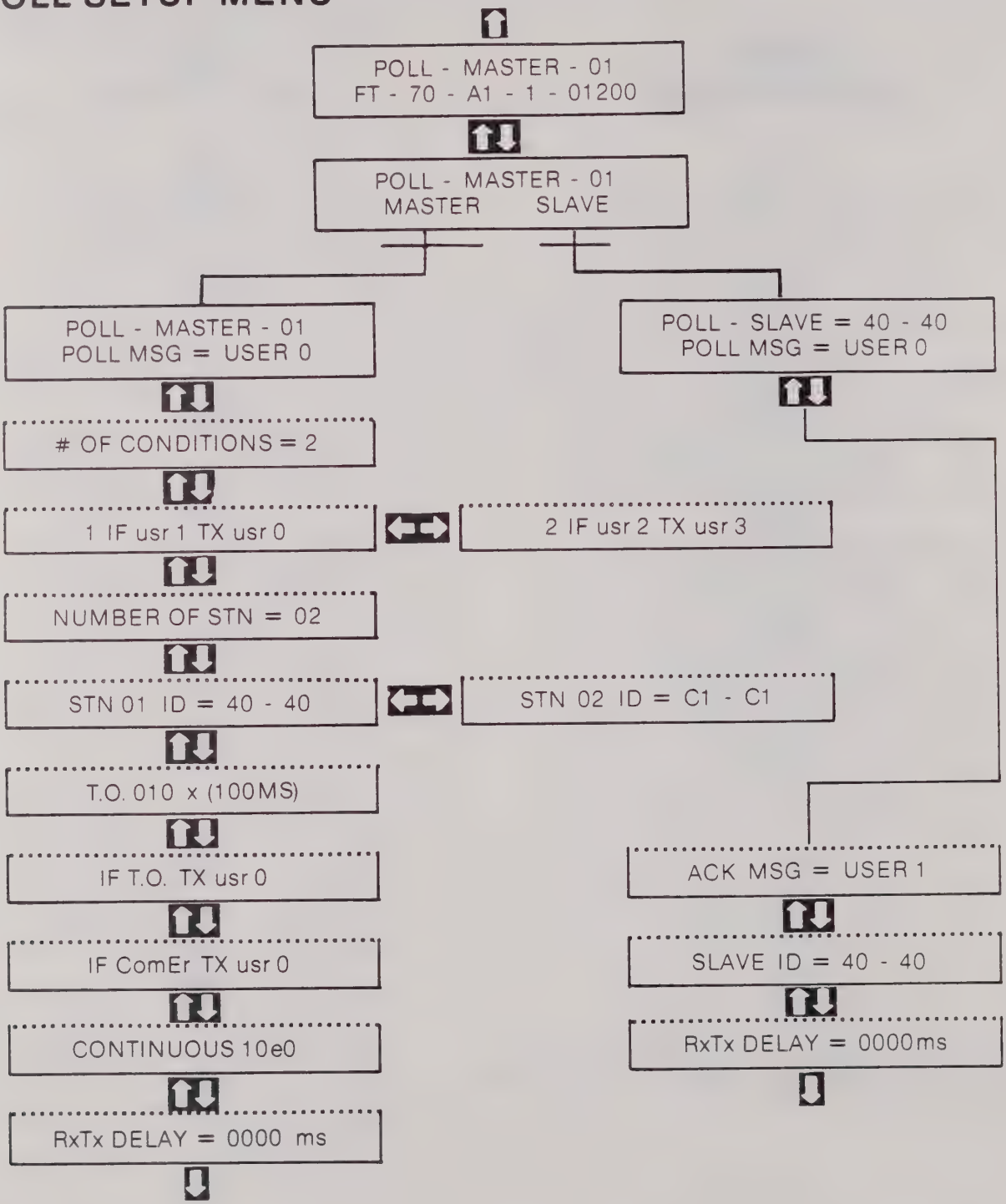

BERT - 511 - CONT
FT - 8 N - SY - E - 02400
BERT - 511 - CONT
63 511 2047 4095 ALT FOX USER □
BERT - 511 - CONT
CONTINUOUS 10e0
BERT - 511 - CONT
TIMEOUT - 010 sec
BERT - 511 CONT
SIMPLEX ? N/Y

***NOTE:** IF "Y" IS SELECTED IN SIMPLEX, THE LINE PARAMETER SECTION OF THE DISPLAY WILL START FLASHING.

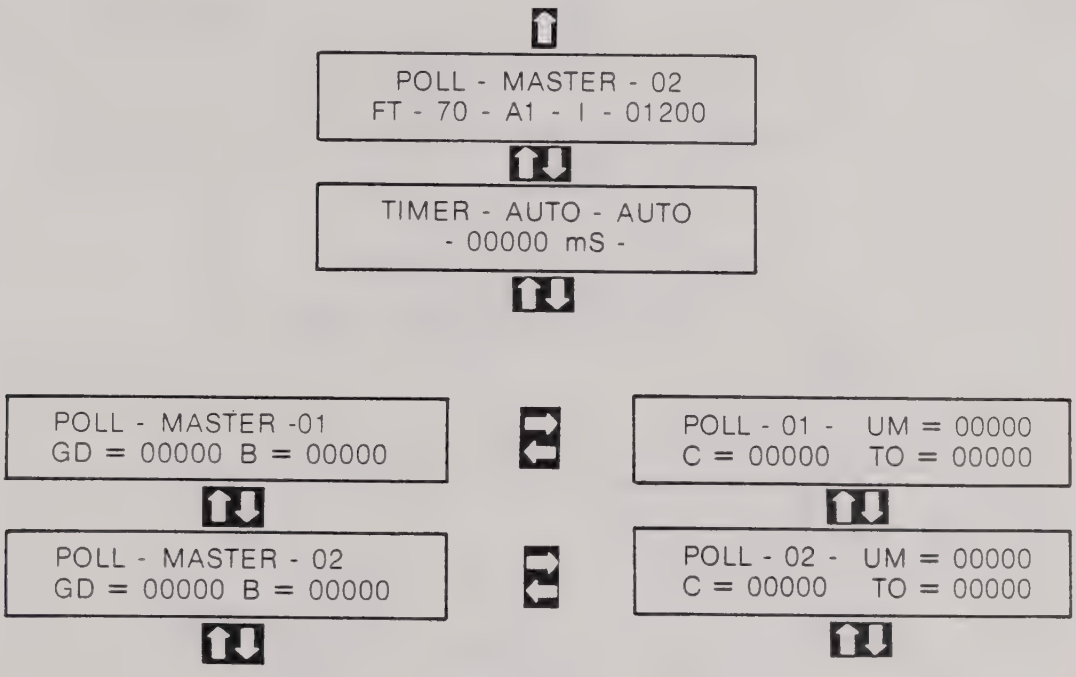
BERT RESULT MENU


* * * * * * * * * * * * * * * * (TD)
* * * * * * * * * * * * * * * * (RD)
TIMER - AUTO - AUTO
- 000000 ms -
BERT - 511 - CONT
FT - 8 N - SY - E - 02400
BITS RECD 00000
BIT ERRS 00000
BLKS RECD 00000
BLK ERRS 00000
ERFREE SEC 00000
ERR'D SEC 00000
SYN LOST 00000
TIME OUTS 00000
BERT 0.0000e - 00
BLERT 0.0000e - 00
PAR ERRORS 00000
BCC ERRORS 00000
FRAME ERRS 00000
ERR'D SEC 00000

POLL SETUP MENU

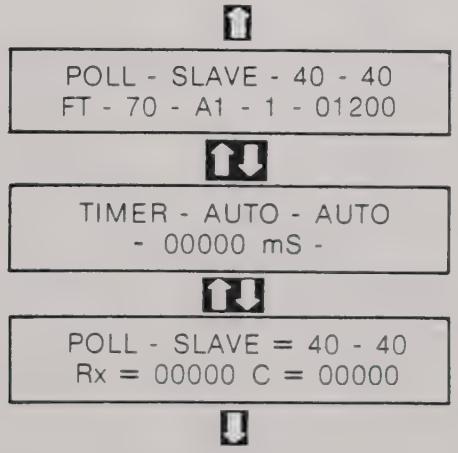

POLL - MASTER - 01
FT - 70 - A1 - 1 - 01200
POLL - MASTER - 01
MASTER SLAVE
POLL - MASTER - 01
POLL MSG = USER 0
OF CONDITIONS = 2
1 IF usr 1 TX usr 0
2 IF usr 2 TX usr 3
NUMBER OF STN = 02
STN 01 ID = 40 - 40
STN 02 ID = C1 - C1
T.O. 010 x (100MS)
IF T.O. TX usr 0
IF ComEr TX usr 0
CONTINUOUS 10e0
RxTx DELAY = 0000 ms
POLL - SLAVE = 40 - 40
POLL MSG = USER 0
ACK MSG = USER 1
SLAVE ID = 40 - 40
RxTx DELAY = 0000ms

POLL RESULT MENU
MASTER MODE

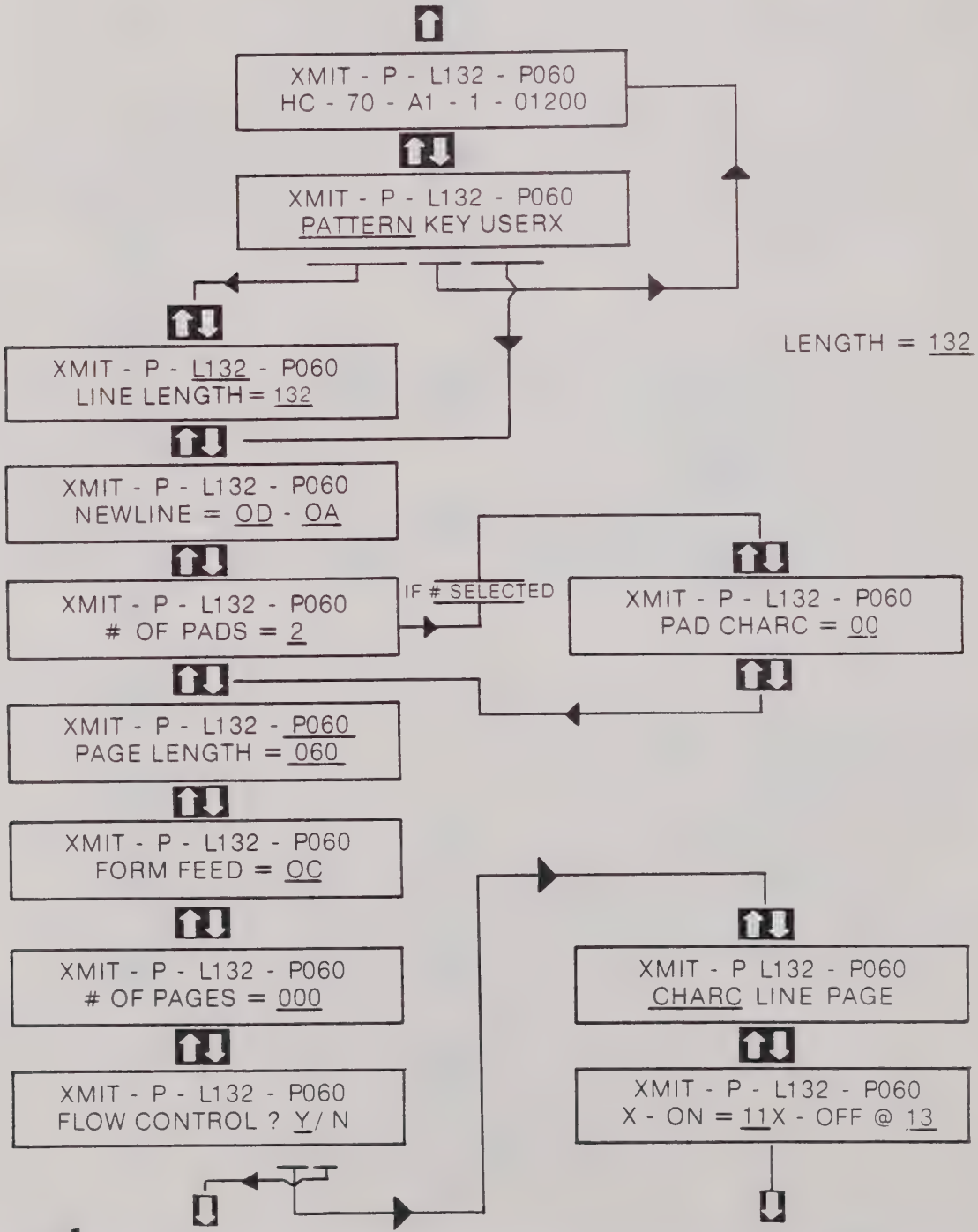


FOR ALL
STATIONS SELECTED

SLAVE MODE

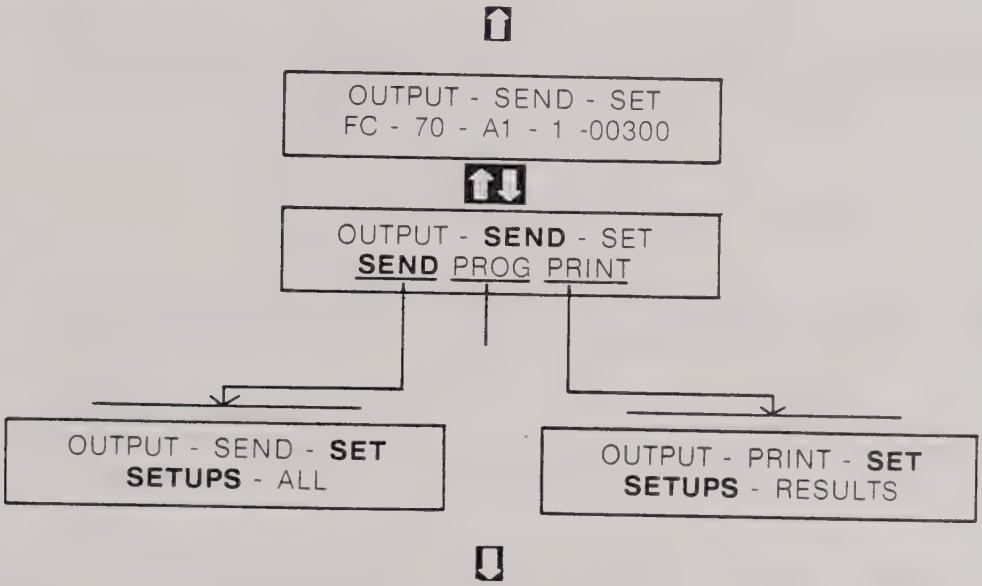


XMIT - SETUP MENU

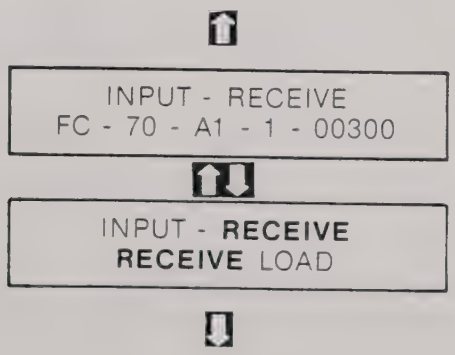

XMIT - P - L132 - P060
HC - 70 - A1 - 1 - 01200
XMIT - P - L132 - P060
PATTERN KEY USERX
LENGTH = 132
XMIT - P - L132 - P060
LINE LENGTH = 132
XMIT - P - L132 - P060
NEWLINE = OD - OA
XMIT - P - L132 - P060
OF PADS = 2
IF # SELECTED
XMIT - P - L132 - P060
PAD CHARC = 00
XMIT - P - L132 - P060
PAGE LENGTH = 060
XMIT - P - L132 - P060
FORM FEED = OC
XMIT - P - L132 - P060
OF PAGES = 000
XMIT - P L132 - P060
CHARC LINE PAGE
XMIT - P - L132 - P060
FLOW CONTROL ? Y/ N
XMIT - P - L132 - P060
X - ON = 11X - OFF @ 13

INPUT / OUTPUT SETUP MENU

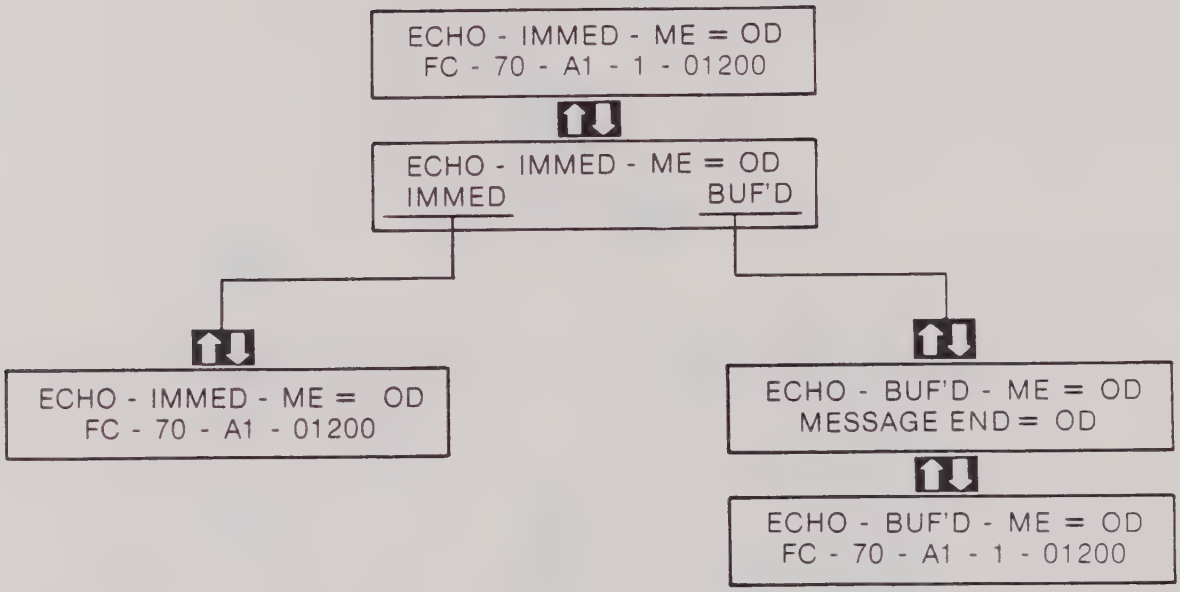
Output Menu


OUTPUT - SEND - SET
FC - 70 - A1 - 1 -00300
OUTPUT - **SEND** - SET
SEND PROG PRINT
OUTPUT - SEND - **SET**
SETUPS - ALL
OUTPUT - PRINT - **SET**
SETUPS - RESULTS

Input Menu



ECHO SETUP MENU


ECHO - IMMED - ME = OD
FC - 70 - A1 - 1 - 01200
ECHO - IMMED - ME = OD
IMMED
BUF'D
ECHO - IMMED - ME = OD
FC - 70 - A1 - 01200
ECHO - BUF'D - ME = OD
MESSAGE END = OD
ECHO - BUF'D - ME = OD
FC - 70 - A1 - 1 - 01200

Appendix 5: Glossary of Technical Terms

Ack Positive acknowledgement. Used in block transmission and indicates that the previous transmission block was accepted by the receiver and that it is ready to accept the next block of the transmission.

Address In data communications, it is the part of a message that contains the identification of the device transmitting the traffic and of the device receiving the traffic. If can also mean a specific location in a program.

Analog Loopback Testing In data communications, a technique whereby a test device transmits a known data pattern into a local modem, where it is passed through the internal modem circuitry, and then retransmitted to the test device. The received signal is compared with the transmitted signal and any errors induced by the modem are detected.

ASCII American Standard Code for Information Interchange. It is a ten or eleven bit character code (1 start bit, 7 data bits, 1 parity bit, and 1 or 2 stop bits) used in data communications

Baud A unit of signaling speed equal to the number of discrete conditions or signal events per second. If each signal event represents only one bit, the baud is the same as the bits per second. However, the signal events may be multi-leveled and in that case the bits per second will be greater than the baud.

Baudot Code A code for the transmission of data in which five equal-length bits represents one character. This code is used in most DC teletype machines where 1 start bit and 1.42 stop bits are added.

BERT Bit Error Rate Test. A data communications testing measurement in which the total number of received bit errors are divided by the total number of received data bits. The smaller the number, the higher quality the communications path.

Bit A contraction of the words, binary digit. It is the smallest unit of information in the binary system.

Bit Rate The speed at which bits are transmitted, usually expressed in bits per second.

BLERT Block Error Rate Test. A data communications testing measurement in which the total number of received block errors are divided by the total number of received blocks. The smaller the number, the higher quality the communications path.

Byte A series of adjacent bits which defines a character, normally considered as 8 bits in length

Channel A path for electrical transmission between two or more points. May also be called circuit, facility, link, or path.

Character A sequence of adjacent bits representing a unit of language

Control Character A character used to convey status of functions, remote diagnostic information, or non print character information.

Data Character A character containing alphanumeric information mainly used in a communications link beween terminals and/or computers

Sync Character A character used to establish and maintain synchronization between computers, multiplexers, and/or synchronous terminals

Code Character bit format used in telegraphic and digital communications.

Common Carrier A government regulated company which furnishes public telecommunications facilities such as a telephone or telegraph company

Data Phone A trademark of the A.T. & T. company to identify the data sets manufactured and supplied by the Bell System for transmitting data over the telephone network.

Data Set A device which performs modulation and demodulation and control functions to provide compatibility between business machines and communications lines for transmission purposes.

Data Types

Asynchronous Data Data which is transmitted character by character where each character has a start bit and one or more stop bits. The characters may be sent at any rate equal to or less than the maximum rate for the paricular system. However, during the transmission of a character the bits must arrive evenly with respect to time

Synchronous Data In this system each data bit is transmitted evenly with respect to time and the data signal is always accompained by a clock signal which is used to strove the data. Usually eight data bits form a character however, and these characters do not normally contain start or stop bits (if they do, this is sometimes referred to as Isochronous data). At the start of each block of data several sync characters are sent to get the machines in sync and once they are in sync the block of data is sent. Therefore, it is essential to maintain bit integrity

Demodulation The process of retrieving the original signal from a modulated carrier wave

Digital Loopback Testing In data communications, a technique whereby a test device transmits a known data pattern through a local modem and a communication channel to a remote modem where it is internally looped back and retransmitted back to the test device. Any bit errors induced in the loopback path will be detected and counted.

Distortion Undesirable changes in a signal during its transmission through a communications system which may cause errors during its retrieval

Drop A connection made available for a terminal on a transmission line.

EBCDIC Extended Binary Coded Decimal for Information Code. A code used in data communications where each character usually has a 9 bit format (8 data bits and 1 parity bit).

Echo Testing A method of checking data transmission accuracy by returning received data to the sending end for comparison with the original data.

Immediate Echo Data is retransmitted character by character, as soon as it is received by the echoing device.

Buffered Echo Data is captured and stored by the echoing device until a predefined message end delimiter character is received. At this time, the accumulated data is retransmitted to the sending end.

EIA Standards Electronic Industry Association Standards for data interchange.

Full Duplex In communications, pertaining to a simultaneous two-way and independent transmission in both directions.

Half Duplex Each side of the communications link capable of receiving or transmitting but not at the same time. When one terminal is sending the other terminal is receiving and vice versa.

Hand Shaking A colloquial term which is used to describe the method by which a modem at one end of a telephone line establishes a contact with a modem at the other end of a telephone line

Interface Shared boundary between two equipments having different functions or different voltage levels

Modem A contraction of the term modulator-demodulator. See Data Set

Multiplex To interleave or simultaneously transmit two or more messages on a single channel

Multipoint Circuit A circuit connecting 3 or more stations.

NAK The negative acknowledge character. See ACK.

Parity Check The addition of non-information bits to data and the use of these bits to detect and/or correct data errors.

Poll The process by which a computer asks a terminal associated with it if the terminal has traffic for the computer.

RS-232C EIA Recommended Standard # 232C interface for data communications and data terminal equipment.

Start Bit A spacing bit signifying the start of a character.

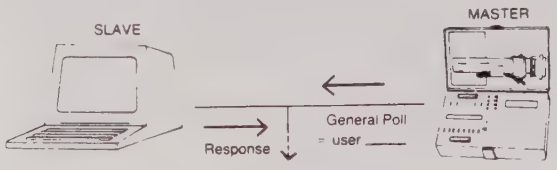
Stop bit A spacing bit signifying the end of a character

Terminal An equipment at the end of a data link used to enter or record data. Examples include CRT terminals, printers, computers, and test sets.

Time Out The failure of a terminal to respond to a poll after a predefined delay period

NAVTEL DATATEST II PLUS POLLING WORKSHEET

Application _____ Date _____



Slave Addresses

1 _____	2 _____	3 _____	4 _____	5 _____
6 _____	7 _____	8 _____	9 _____	10 _____
11 _____	12 _____	13 _____	14 _____	15 _____
16 _____	17 _____	18 _____	19 _____	20 _____
21 _____	22 _____	23 _____	24 _____	25 _____
26 _____	27 _____	28 _____	29 _____	30 _____
31 _____	32 _____			

Condition	Response	Transmission
1	IF USER _____	TX USER _____
2	IF USER _____	TX USER _____
3	IF USER _____	TX USER _____
4	IF USER _____	TX USER _____
5	IF USER _____	TX USER _____
6	IF USER _____	TX USER _____
7	IF USER _____	TX USER _____
	IF T.O. TX USER _____	
	IF ComEr TX USER _____	

*** # conditions = # different responses
*** At least 1 transmission must be the general poll message
*** Address substitution characters 8F 8F (hex)
*** Don t care character 80 (hex)

Line Parameters

Line: _____
Level: _____
Protocol _____
#Outsync _____
Outsync = _____
BCC? _____
Clock _____
Speed _____
DTE/DCE _____
Parity _____
Syn _____
Code _____
RTS/CTS _____

User Messages

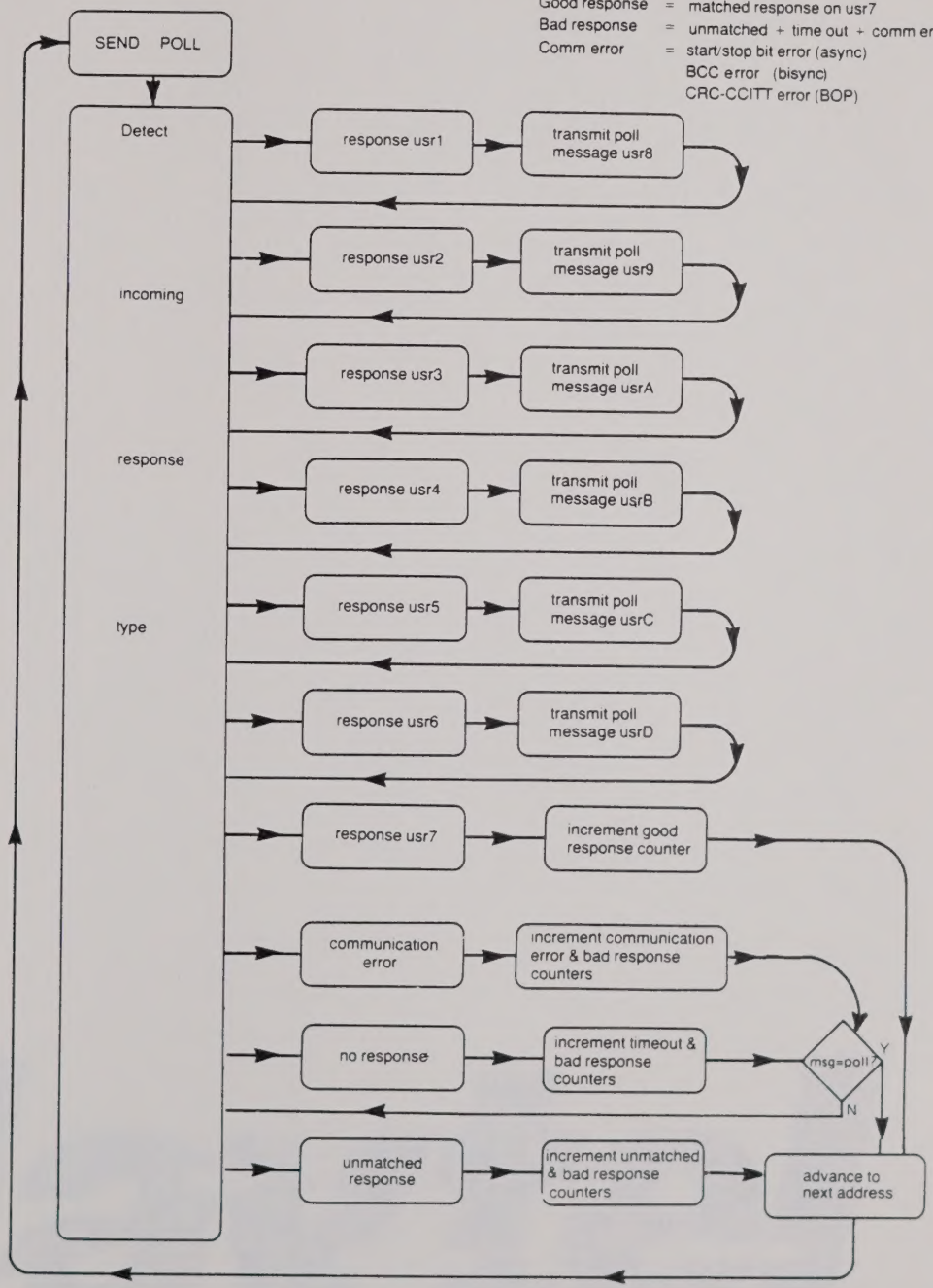
USER 0: _____ Hex
USER 1: _____ Hex
USER 2: _____ Hex:
USER 3: _____ Hex
USER 4: _____ Hex
USER 5: _____ Hex
USER 6: _____ Hex
USER 7: _____ Hex:
USER 8: _____ Hex
USER 9: _____ Hex:
USER A: _____ Hex:
USER B: _____ Hex:
USER C: _____ Hex
USER D: _____ Hex
USER E _____ Hex
USER F _____ Hex

DATATEST II PLUS POLLING DESCRIPTION & FLOWCHART

Example Setup

poll = usr0
# conditions = 7
if usr1 tx usr8
if usr2 tx usr9
if usr3 tx usrA
if usr4 tx usrB
if usr5 tx usrC
if usr6 tx usrD
***if usr7 tx usr0
if T.O. TX usr0
if ComEr TX usr0

Good response = matched response on usr7
Bad response = unmatched + time out + comm error
Comm error = start/stop bit error (async)
BCC error (bisync)
CRC-CCITT error (BOP)



*** At least 1 'if tx' condition must point back to the original poll message. It is this condition that will increment the good response counter and advance to the next address.

NOTES:

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